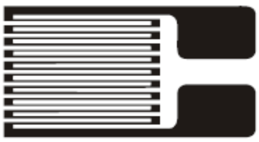
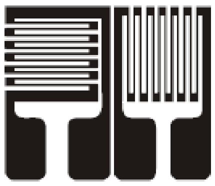
making sense with sensors

Full Catalogue





StrainSense Ltd
Old Stratford Business Park
Falcon Drive, Old Stratford
Milton Keynes, MK19 6FG
T: +44 (0)1908 305 960
W: www.strainsense.co.uk
E: sales@strainsense.co.uk

Strain Gauge Catalogue

03/05/16

making sense with sensors

Directory

Designation system for Strain gage ... 1

Strain gage's designation system (KA series) ... 2

Self–Temperature Compensation strain gages ... 2

Self–Creep Compensation Strain Gages ... 4

Self–Elastic Modulus Compensation Strain Gages ... 5

Strain gage specifications ... 6

SBF, SBAM, SBHB, SBA series strain gages ... 8

SZF, SZAM series strain gages ... 15

SBAB 250°C series ... 21

Compensation Resistor Designation and Selection ... 22

Designation system for compensation resistors ... 22

How to choose compensation resistors ... 23

Transducer wiring compensation skeleton drawing ... 26

Compensation resistor specification ... 26

SRBF, SRNF, SRCF series compensation resistor ... 27

Semi–conductor strain gages ... 30

Designation system for semi–conductors ... 30

Linear Compensation Principle ... 30

Semi–conductor stain gauges ... 31

Designation System for Strain Gage

expect for KA series

S Z F 1000 - 2 GB-B L6 80 (23) N6 - X

- Gage Type
- Type of Backing Material
- Nominal Resistance (Ω)
- Sensitive Grid Length (mm)
- Sensitive Grid Patterns Code
- Distance between Grid Centers
- Ultimate Working Temperature (℃) (omission by temperature lower than 60℃)
- Self–Temp. Compensation Code or Self–elastic Modulus Compensation Code
- Self–Creep Compensation Code
- Lead Wire Form (sealing form)

B: Foil Gages
Z:Appropriative (Karma Foil)
T: Special Purpose

L6 = 6.0 L68 = 6.8
L7=7.0 L0=10.5

F: Modified Phenolic
A: Polyimide
E: Phenolic–Acetal
H: Modified Epoxy
Q: Paper
J: Polyurethane
AM: Polyimide Film
PM: Polyurethane Film
HB: Glass Fiber Rein forced Epoxy
AB: Glass Fiber Reinforced Polyimide

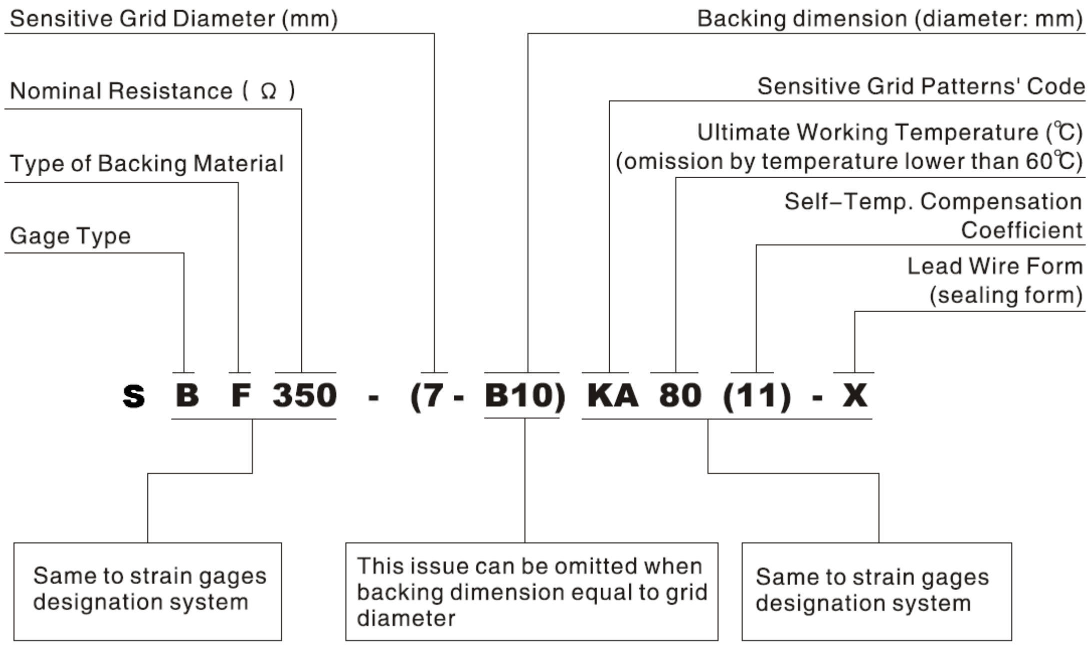
STC or EMC Code
9: Alloy Titanium
11: Alloy steel, Marten site Stainless Steel and Deposit Scleroses Stainless Steel
16: Austenitic Stainless Steel and Copper–Based Material
23: For Alloy Aluminum
27: For Alloy Magnesium
–M23: For Alloy–Aluminum

C: Solder tabs exposed
D: Solder tin dots and encapsulation
F: Non–lead wire and fully open–faced
H: Non–lead wire, fully open–faced and whole sheet package
U: Lead wire and fully open–faced
M: Non–lead wire and adhesive cover
S: Solder tabs exposed and strips package
X: Standard lead wire and encapsulation
P※※: Encapsulation, PVC lead wires, ※※: Length of lead wire
X※※:Encapsulation, Column lead wires, ※※: Length of lead wire
BX※※: Encapsulation. Belt lead wire, ※※ length of lead wire
Q※※:Encapsulation, Varnish wrapped wires, ※※ length of lead wire
G※※:Encapsulation, High temp. lead wires, ※※ length of lead wire

Creep Code:
T5, T3, T1, T8, T6, T4, T2, T0, N2,
N4, N6, N8, N0, N1, N3, N5, N7, N9

Strain Gage's Designation System (KA series)

Diaphragm gages only



1.Self–Temperature Compensation strain gages

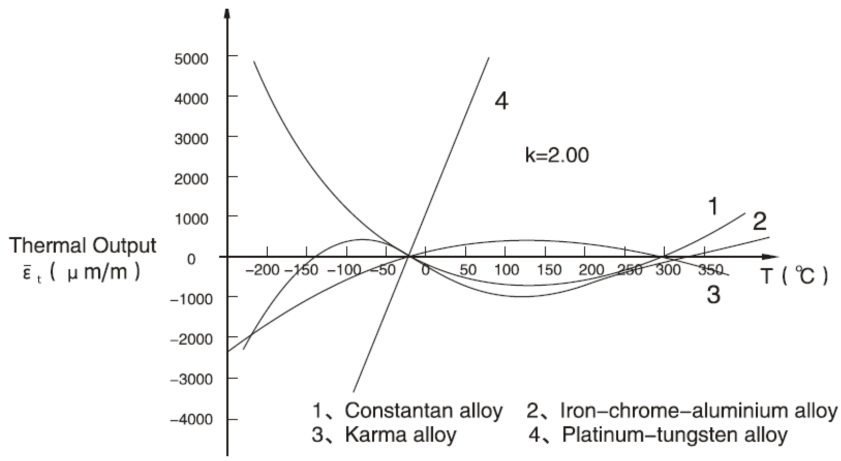
Introduction:

The strain gages are installed on surface of a tested object without outside force, when environmental temperature changes, the resistance value will be changed accordingly. This phenomenon is called strain gages thermal output. It is resulted by interactions and superposition of resistance temperature coefficient of grid materials, sensitive grid materials and linear dilatability coefficient of the tested objects. It is shown as the formula below:

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

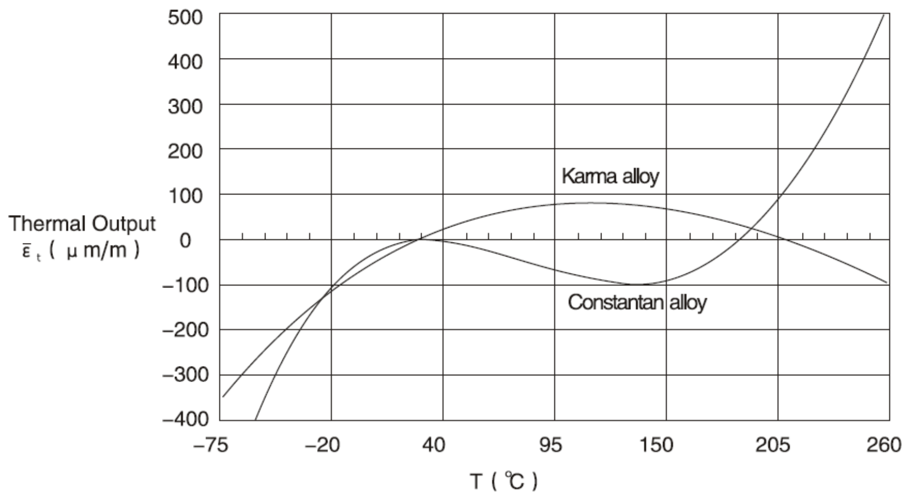
In the above formula, α_g and β_g refer to resistance temperature coefficient of the grid materials and linear dilatability of strain gages respectively; K refers to gage factor; β_s refers to linear dilatability coefficient of the tested object; $\triangle t$ refers to relative temperature changes of reference departure temperature.

Thermal output of common strain gages is as large as shown in Picture 1. It is the largest error resource of strain measurement in static state. With increase of the temperature effect, the decentralization of thermal output will also be increased. If there are temperature grads or instant changes during test, the difference will become larger. Therefore, the ideal circumstance is that strain gages thermal output value is close to zero. The strain gages that fulfill this requirement are called self–temperature compensation strain gages.



Picture 1 Thermal Output Curve Common Strain Gages

By adjusting the alloy elements' ratio of the strain gages grid material or changing foil's cold rolled reduction and proper heat treatment, the crystal configuration of the sensitive grid would be recombined and its temperature coefficient of the resistance would be changed. Therefore, to make strain gages' thermal output close to zero and to realize the self−temperature compensation for spring element or tested object materials, to meet the requirement of the high precision strain analysis and transducer production. Picture 2 is the typical thermal output curve of the Constantan, Karma self−temperature compensation strain gages. In the range of +20~~+250℃, their thermal output value is very small.



Picture 2 Typical Thermal Output Curves of the Constantan and
Kama Self−Temperature Compensation Strain Gages

Selection Methods:

(1)At present, ZEMIC offers self-temperature compensation strain gages with codes of: 9、11、16、23、27. Among them, "9" is used for alloy titanium materials (the typical value of the linear coefficient expansion is 8.8×10^{-6}/℃); "11" used for alloy steel, Marten site stainless steel and deposit scleroses stainless steel materials (the typical value is 11.3×10^{-6}/℃); "16" used for austenitic stainless steel and Cu-based material (the typical value is 16×10^{-6}/℃); "23" used for alloy aluminum materials (the typical value is 23.2×10^{-6}/℃); "27" used for alloy magnesium materials (the typical value is 26.1×10^{-6}/℃).

(2) When the self-temperature compensation gages matched with the material of tested object, it is not necessary to compensate thermal output within the range of compensation temperature.

(3) In case that the material of the tested object required by self-temperature compensation gages did not match the material of the tested object that is used, we should utilize two or four gages to form a half bridge or full bridge to minimize the temperature effect.

(4) Measure with Quarter Bridge, we should install a strain gage on" compensated object" which is he same material as the tested object. The strain gage should be from the same lot as the one installed on the tested object. The two gages should be under the same temperature environment and located next to each other in the Wheatstone bridge.

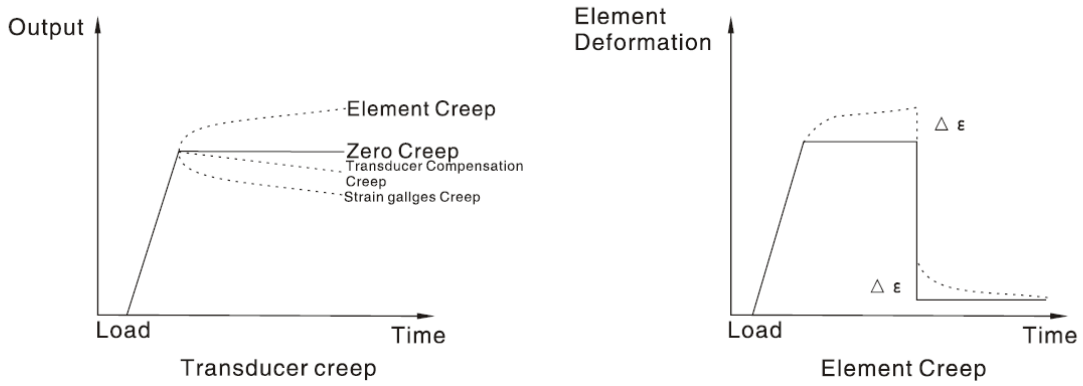
2. Self-Creep Compensation Strain Gages

Introduction:

The creep characteristics exist in spring element because of an elasticity of its materials, which makes the transducer output increasing with the addition of time (positive creep), and depends on several variables such as the spring element material, structure, strain field, span, heat treatment and test temperature, etc. The backing of gages and the bonding adhesive have high viscoelasticity that results in the output decreasing with the addition of time; but grid material of gages has an anelasticity which makes the output increasing with the addition of time. The result of accumulation is that the strain gages have positive or negative creep under fixed load; its direction and value could be adjusted by modifying the design of grid structure, backing material ratio and key technology parameter. For example, changing the dimension of the end grid and fixing the other parameters, we can get the curve of creep characteristic as shown in picture 4. After selecting materials of spring element, if gage creep is equal to spring element creep in value but the direction is opposite, then we can compensate the creep of spring element. In the same way, during making transducers, the creep error caused by other factors could be adjusted by this way, and the combined creep value could be limited in minimum range (as shown in picture 3). ZEMIC offers many models of gages which standard creep grads to be selected by transducer manufacturers. (The N※, T※ in strain gages designation refer to creep code, different codes represent different creep value. The rule is: the creep difference between any two-neighbor codes is 0.01-0.015%FS/ 30min)

N9 > N7 > N5 > N3 > N1 > N0 > N8 > N6 > N4 > N2 > T0 > T2 > T4 > T6 > T8 > T1 > T3 > T5

\+ ← Creep → −



Picture 3 Sketch Map for Creep

Selection Methods:

(1) For first time using, please select one or two models of gages which have great different creep values (different creep codes) and bond them onto the spring element. The matched creep codes will be determined according to actual test value of comprehensive creep and direction.

(2) For transducers having the same spring materials and structure, the smaller the capacity are, the more positive creep would be, therefore a more negative creep code should be selected.

(3) Different element material exhibits different creep characteristic. Therefore, different creep code should be selected for steel and aluminum transducers with the same capacity and structure.

(4) Transducer creep depends on many variables such as spring elements, strain gages, adhesive as well as the sealing form, protective coating, technique parameters, etc. The direction and magnitude of such error can be predicted, and shall be considered when selecting creep code.

3. Self-Elastic Modulus Compensation Strain Gages

Introduction:

With raise of the ambient temperature, the elastic modulus materials will go down. According to the Hooke's theory, as environmental temperature increased the deformation of this structure will be bigger even if the load is not changed. Therefore, the tested strain will be increased along with it. At that time, if the gage factor can be reduced properly with temperature, the output of gages will not be changed as temperature changes. Therefore, the compensation of elastic modulus will be realized. Such kind of strain gages is also called self-elastic modulus compensation strain gages.

The self-elastic modulus compensation strain gages perform the function of common gages and elastic modulus compensation resistor. It also can provide good correction of the sensitivity error of transducer that caused by material of elastic modulus changes with temperature. If self-elastic modulus compensation strain gages are matched with spring materials, the temperature drift of transducer sensitivity will be less than 0.002%FS/℃. CoMPared to common used methods, the self-elastic modulus compensation strain gages take the advantages of high accuracy in compensation, good stability, higher sensitivity, easier usage, lower cost and so on. However, the thermal output of strain gages only with self-elastic modulus compensation is a little bit larger, so zero temperature drift of transducers will be larger, which limited to further improve the precision of transducers. After many years research, we have developed and produced strain gages with self-temperature compensation and self-elastic modulus compensation that solved these problems especially for strain gages with half and full bridge. They have become very popular because of their good temperature capability.

Selection Method:

(1) In order to get satisfied compensation result, the elastic modulus compensation gages must be matched with transducer spring materials. Generally, we should choose proper strain gages by testing at least five transducers.

(2)The gages have no functions of self-temperature compensation for most materials; their thermal output is larger than that of ordinary self-temperature compensation gages, therefore they are recommended to use for transducers with smaller temperature grads. It is better to adopt half-bridge or full-bridge gages to gain less zero-temperature drift.

(3)Soldering of elastic modulus compensation gages is more difficult than that of common gages. A special flux can be available from our factory. Carefully solder and clean them completely.

Strain gage specifications

Series	Nominal resistance (Ω)	Resistance tolerance to average resistance	Gage factor	Dispersion of gages factor	Strain limit	Fatigue life	STC code	Working temperature range (℃)
SBF Series	350 650 1000	≤±0.1%	2.00~2.20	≤±1%	2.0%	10^7	9、11、16、23、27	-30~+80
SBAM Series								
SBHB Series								
SBA Series			1.86~2.20					-86~+150
SZF Series								-30~+80
SZAM Series								
SBAB 250℃ Series	120, 350	≤±0.15%	1.86~1.98		1.5%			-269~+250

SZF Series

Fully encapsulated Karma foil gages with modified phenol backing. Offer both self–temperature (or elastic modulus) and creep compensations simultaneously. With high accuracy and excellent stability over a wide temperature range, especially suitable for accuracy class 0.02 transducers, especially suitable for DC/AC electronic weighing instruments.

SBA Series

Fully encapsulated Constantan foil gages with polyamide backing with self–temperature compensations. With high elongation, excellent heat resistance and wide temperature range. Primarily intend for both precision stress analysis and normal accuracy transducers with temperature up to 150℃.

SBAM Series

Fully encapsulated Constantan foil gages with thin polyamide film balking backing with self–temperature and creep compensations simultaneously. With high elongation, excellent heat resistance, wide temperature range, low hydroscopicity , and good feature in creep and zero–return. Primarily intend for high accuracy transducers at class 3 or better class.

SBHB Series

Fully encapsulated Constantan foil gages with glass fiber reinforced epoxy backing. Offer both self–temperature and creep compensations simultaneously. With high accuracy and excellent stability over a wide temperature range and moisture resistant capability, low hydroscopicity , good feature in creep and zero–return, and suitable for transducers at accuracy class3 or higher class.

SZAM Series

Fully encapsulate Kama foil gages with thin polyamide film backing. Offer both self–temperature and creep compensations simultaneously. With high accuracy and excellent stability over a wide temperature range and moisture resistant capability, low hydroscopicity, good feature in creep and zero–return, and suitable for transducers at accuracy class3 or higher class.

SBA 250°C Series

Kama foil gages imported Glass Fiber Reinforced Polyimide backing. Offer excellent heat resistance, good insulation, thin backing film, high stability and are suitable for both high precision stress analysis and accuracy transducers with temperature up to 250℃.

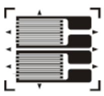
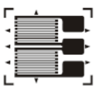
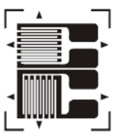
SBF, SBAM, SBHB, SBA series strain gages

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SBF, SBAM, SBH, SBA 100-4AA(※※)N※	4.0×1.9	8.0×3.6	T0	
	SBF, SBAM, SBH, SBA 120-2AA(※※)N※	1.8×1.8	5.2×3.2	T0	
	SBF, SBAM, SBH, SBA 120-3AA(※※)N※	2.8×2.0	6.4×3.5	T0、N0、N1、N3、N4、N6、N8	
	SBF, SBAM, SBH, SBA 120-4AA(※※)N※	4.0×3.3	7.9×4.6	N6	
	SBF, SBAM, SBH, SBA 120-5AA(※※)N※	5.0×2.0	10.1×4.0	N0	
	SBF, SBAM, SBH, SBA 120-6AA(※※)N※	5.9×2.7	9.8×4.3	N5	
	SBF, SBAM, SBH, SBA 175-1AA(※※)N※	1.5×2.6	4.6×3.6	N0、N6、N8	
	SBF, SBAM, SBH, SBA 175-2AA(※※)N※	2.1×1.9	6.0×3.5	N6	
	SBF, SBAM, SBH, SBA 175-3AA(※※)N※	3.0×2.4	6.8×3.5	N8、N0	
	SBF, SBAM, SBH, SBA 200-4AA(※※)N※	4.0×2.2	8.0×3.6	T0	
	SBF, SBAM, SBH, SBA 200-6AA(※※)N※	6.0×2.2	10.4×4.5	N0、T0	
	SBF, SBAM, SBH, SBA 240-3AA(※※)N※	3.2×3.1	7.4×4.4	N8	
	SBF, SBAM, SBH, SBA 300-2AA-W(※※)N※	2.0×2.0	3.8×2.8	T8	
	SBF, SBAM, SBH, SBA 300-3AA-A(※※)N※	3.0×1.9	5.5×2.5	T4	
	SBF, SBAM, SBH, SBA 350-10AA(※※)N※	9.4×4.1	15.4×6.1	N9	
	SBF, SBAM, SBH, SBA 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	
	SBF, SBAM, SBH, SBA 350-1.5AA(※※)N※	1.5×4.0	4.9×4.8	N3、N6、T1、T2、T3、T4、T5、T6、T8	
	SBF, SBAM, SBH, SBA 350-2AA-A(※※)N※	2.4×3.0	4.9×4.0	N1、N4、N6、T4、T0	
	SBF, SBAM, SBH, SBA 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	
	SBF, SBAM, SBH, SBA 350-2AA-P(※※)N※	2.0×2.4	5.0×3.5	N0、N2、N4、T0、T1、T2、T3、T4、T5、T6、T8	
	SBF, SBAM, SBH, SBA 350-3AA-A(※※)N※	3.2×1.6	6.9×3.1	N0、N6、N8	
	SBF, SBAM, SBH, SBA 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	
	SBF, SBAM, SBH, SBA 350-3AA-B(※※)N※	3.0×3.1	14.3×4.5	N0、N1、N2、N3、N5、N6、N7、T2、T3、T4、T8	
	SBF, SBAM, SBH, SBA 350-4AA(※※)N※	3.8×2.2	8.2×4.2	N0、N2、N6、N9、T6	
	SBF, SBAM, SBH, SBA 350-5AA(※※)N※	5.0×2.9	9.3×4.5	N0、N1、N2、N3、N4、N6、N8、T0、T2	
	SBF, SBAM, SBH, SBA 350-6AA(※※)N※	6.1×3.1	10.4×5.4	N0、N6、T0	
	SBF, SBAM, SBH, SBA 500-4AA(※※)N※	4.0×3.3	7.9×4.6	T0、N4、N6	
	SBF, SBAM, SBH, SBA 650-4AA-A(※※)N※	4.0×3.2	7.8×4.2	N6	

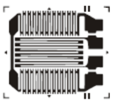
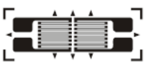
SBF, SBAM, SBHB, SBA series strain gages

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SBF, SBAM, SBH, SBA 650-4AA(※※)N※	4.0×4.4	8.6×6.0	N6	
	SBF, SBAM, SBH, SBA 650-5AA(※※)N※	5.0×3.9	9.0×5.6	N6	
	SBF, SBAM, SBH, SBA 650-6AA(※※)N※	6.0×4.2	10.0×5.2	N6	
	SBF, SBAM, SBH, SBA 700-3AA(※※)N※	3.2×3.1	7.4×4.4	N2、N4、N6、T0、N6	
	SBF, SBAM, SBH, SBA 840-4AA(※※)N※	4.0×3.6	7.9×4.6	N6	
	SBF, SBAM, SBH, SBA 1000-2AA(※※)N※	2.2×4.6	5.8×5.8	N0、N2、N6、T0、T1、T2、T4、T5、T6、T8	
	SBF, SBAM, SBH, SBA 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	
	SBF, SBAM, SBH, SBA 1000-4AA(※※)N※	4.0×4.2	7.7×5.4	N8	
	SBF, SBAM, SBH, SBA 1000-6AA(※※)N※	6.0×4.0	9.9×5.4	N6	
	SBF, SBAM, SBH, SBA 1000-10AA(※※)N※	10.0×4.2	14.8×6.0	N0	
	SBF, SBAM, SBH, SBA 350-2HA(※※)N※	2.0×4.4	9.0×5.6	N2、N4、N5、N6、T0、T4	
	SBF, SBAM, SBH, SBA 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	
	SBF, SBAM, SBH, SBA 350-4HA(※※)N※	3.8×4.2	9.0×7.8	N4、N6、T0、T4	
	SBF, SBAM, SBH, SBA 350-6HA(※※)N※	5.7×6.1	10.9×10.5	N4	
	SBF, SBAM, SBH, SBA 1000-3HA(※※)N※	3.0×5.5	9.9×6.2	N4、N8、T2、T6、T8	
	SBF, SBAM, SBH, SBA 1000-4HA(※※)N※	4.0×5.6	9.9×7.5	T0	
	SBF, SBAM, SBH, SBA 350-2HA-A(※※)N※	2.0×4.4	9.0×5.6	N2、N4、N6、T0、T4、T8	
	SBF, SBAM, SBH, SBA 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	
	SBF, SBAM, SBH, SBA 350-4HA-A(※※)N※	3.8×4.2	9.0×7.8	N4	
	SBF, SBAM, SBH, SBA 350-6HA-A(※※)N※	5.7×6.1	10.9×10.5	N8	
	SBF, SBAM, SBH, SBA 1000-3HA-A(※※)N※	3.0×5.5	9.9×6.2	N2、N4、T2	
	SBF, SBAM, SBH, SBA 350-2HA-B(※※)N※	2.0×2.5	7.2×6.3	N6、N8	
	SBF, SBAM, SBH, SBA 350-3HA-B(※※)N※	3.1×4.0	9.5×7.8	N4、N6、N8、T0、T4	
	SBF, SBAM, SBH, SBA 350-5HA-B(※※)N※	4.8×4.1	10.7×9.3	N4	
	SBF, SBAM, SBH, SBA 1000-5HA-B(※※)N※	4.8×6.5	15.7×9.6	N4	
	SBF, SBAM, SBH, SBA 350-2HA-C(※※)N※	2.0×2.5	7.2×6.3	N0、N2、N4、N6、N8、T2、T4、T8	
	SBF, SBAM, SBH, SBA 350-3HA-C(※※)N※	3.1×4.0	9.5×7.8	N2、N4、N6、N8、N9、T0、T4、T6、T8、T9	
	SBF, SBAM, SBH, SBA 1000-3HA-C(※※)N※	3.1×5.4	10.7×7.8	N4、N8、T0、T4	
	SBF, SBAM, SBH, SBA 350-2HA-D(※※)N※	2.1×4.3	8.9×5.7	N8	
	SBF, SBAM, SBH, SBA 350-3HA-D(※※)N※	2.9×4.0	8.8×6.8	N4 、N8、T0、T1、T4	
	SBF, SBAM, SBH, SBA 350-4HA-D(※※)N※	4.2×2.8	8.3×8.3	N4、N8	
	SBF, SBAM, SBH, SBA 350-6HA-D(※※)N※	5.9×3.7	10.5×11.1	N8	

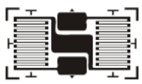
SBF, SBAM, SBHB, SBA series strain gages

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SBF, SBAM, SBH, SBA 350–2HA–E(※※)N※	2.0×4.3	8.9×5.7	N8	
	SBF, SBAM, SBH, SBA 350–3HA–E(※※)N※	3.0×3.9	8.8×6.8	N4、N8	
	SBF, SBAM, SBH, SBA 350–4HA–E(※※)N※	4.2×2.8	8.3×8.3	N4、N8	
	SBF, SBAM, SBH, SBA 350–6HA–E(※※)N※	5.9×3.7	10.5×11.4	N8	
	SBF, SBAM, SBH, SBA 60–3AB(※※)N※	3.0×3.0	8.2×5.1	T0	
	SBF, SBAM, SBH, SBA 120–6AB(※※)N※	5.8×5.8	9.7×7.4	N8	
	SBF, SBAM, SBH, SBA 175–2AB(※※)N※	2.0×2.0	6.7×3.7	N8、T0	
	SBF, SBAM, SBH, SBA 175–3AB(※※)N※	3.0×3.0	8.2×5.1	N8	
	SBF, SBAM, SBH, SBA 280–3AB(※※)N※	3.0×3.0	8.2×5.1	N0	
	SBF, SBAM, SBH, SBA 350–2AB(※※)N※	2.0×2.0	6.7×3.7	N0、N4、N8、T3	
	SBF, SBAM, SBH, SBA 350–3AB(※※)N※	3.0×3.0	8.2×5.1	N0、N1、N2、N4、N5、N6、N8、T0、T6	
	SBF, SBAM, SBH, SBA 350–4AB(※※)N※	4.0×4.0	9.1×5.8	N8	
	SBF, SBAM, SBH, SBA 350–6AB(※※)N※	5.9×5.9	12.0×8.3	N5	
	SBF, SBAM, SBH, SBA 350–8AB(※※)N※	7.9×7.9	13.3×10.0	N8	
	SBF, SBAM, SBH, SBA 500–4AB(※※)N※	4.0×4.0	9.1×5.8	N8	
	SBF, SBAM, SBH, SBA 350–2FB(※※)N※	2.1×2.8	6.4×7.6	N6、T0	
	SBF, SBAM, SBH, SBA 350–3FB(※※)N※	3.2×2.8	7.4×7.4	N0、N1、N2、N3、N4、N5、N6、N8、N9、T0、T2、T4、T8	
	SBF, SBAM, SBH, SBA 350–4FB(※※)N※	4.0×2.4	7.8×6.2	N6、T0	
	SBF, SBAM, SBH, SBA 350–6FB(※※)N※	5.9×2.8	9.8×7.3	N6	
	SBF, SBAM, SBH, SBA 1000–3FB(※※)N※	3.0×5.3	12.1×6.7	T0	
	SBF, SBAM, SBH, SBA 350–3FB–A(※※)N※	3.2×2.5	6.8×6.4	N2	
	SBF, SBAM, SBH, SBA 100–4BB(※※)N※	4.0×4.4	10.3×7.5	T0	
	SBF, SBAM, SBH, SBA 120–2BB(※※)N※	1.8×2.4	6.3×5.5	N2	
	SBF, SBAM, SBH, SBA 120–3BB(※※)N※	2.8×3.3	8.5×6.5	N6	
	SBF, SBAM, SBH, SBA 120–4BB(※※)N※	4.0×4.4	10.3×7.5	T0	
	SBF, SBAM, SBH, SBA 240–4BB(※※)N※	4.0×4.4	10.3×7.5	T0	
	SBF, SBAM, SBH, SBA 350–1BB(※※)N※	2.4×2.1	5.5×5.5	N0	
	SBF, SBAM, SBH, SBA 350–2BB(※※)N※	2.0×2.6	7.2×6.0	N8	
	SBF, SBAM, SBH, SBA 350–3BB(※※)N※	3.0×3.3	8.6×6.6	N2、N8、T4	
	SBF, SBAM, SBH, SBA 350–4BB(※※)N※	4.0×4.1	9.7×7.7	T0	
	SBF, SBAM, SBH, SBA 350–6BB(※※)N※	6.0×6.0	13.8×9.7	T0	
	SBF, SBAM, SBH, SBA 600–4BB(※※)N※	3.9×4.1	9.7×7.7	N6、N0	
	SBF, SBAM, SBH, SBA 650–4BB(※※)N※	4.0×4.4	10.3×7.9	N6	

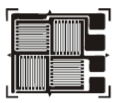
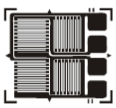
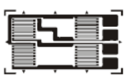
SBF, SBAM, SBHB, SBA series strain gages

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SBF, SBAM, SBH, SBA 120–2BB–A(※※)N※	1.8×2.2	6.3×5.4	T0	
	SBF, SBAM, SBH, SBA 120–3BB–A(※※)N※	2.8×3.3	8.5×6.5	N6	
	SBF, SBAM, SBH, SBA 120–4BB–A(※※)N※	4.0×4.4	10.3×7.5	T0	
	SBF, SBAM, SBH, SBA 350–2BB–A(※※)N※	2.0×2.7	6.9×6.0	T4、N0	
	SBF, SBAM, SBH, SBA 350–3BB–A(※※)N※	3.0×3.4	9.8×6.8	N2	
	SBF, SBAM, SBH, SBA 350–4BB–A(※※)N※	4.0×4.1	9.7×7.7	T0、N6	
	SBF, SBAM, SBH, SBA 350–6BB–A(※※)N※	5.9×6.3	14.3×9.6	T0、N6	
	SBF, SBAM, SBH, SBA 800–2BB–A(※※)N※	2.0×3.5	5.8×5.8	T0	
	SBF, SBAM, SBH, SBA 1000–4BB–A(※※)N※	3.6×4.0	9.4×7.0	T0	
	SBF, SBAM, SBH, SBA 160–5BB(※※)N※	4.9×3.0	9.6×9.8	N4	
	SBF, SBAM, SBH, SBA 600–5BB(※※)N※	4.9×3.2	9.6×9.8	T0	
	SBF, SBAM, SBH, SBA 600–5BB–A(※※)N※	4.9×3.2	9.6×9.8	N0、N1、N4、N6、N8、T0	
	SBF, SBAM, SBH, SBA 700–5BB–A(※※)N※	4.9×3.2	9.6×9.8	N0、N4、N6、N8、T0、T2	
	SBF, SBAM, SBH, SBA 1000–5BB–A(※※)N※	4.9×3.2	9.6×9.8	N6	
	SBF, SBAM, SBH, SBA 160–5BB–C(※※)	5.2×2.6	9.4×8.1		
	SBF, SBAM, SBH, SBA 350–5BB–C(※※)	5.2×2.6	9.4×8.1		
	SBF, SBAM, SBH, SBA 700–5BB–C(※※)	5.2×2.6	9.4×8.1		
	SBF, SBAM, SBH, SBA 350–2GB(※※)N※	2.1×3.0	10.8×4.4	T0、N6	2.7
	SBF, SBAM, SBH, SBA 350–3GB(※※)N※	3.1×2.8	12.4×4.4	N4、N6	3.8
	SBF, SBAM, SBH, SBA 350–4GB(※※)N※	4.0×3.8	15.3×5.8	T0	5.0

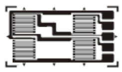
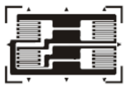
SBF, SBAM, SBHB, SBA series strain gages

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SBF, SBAM, SBH, SBA 350–1GB–AL0(※※)N※	1.5×2.5	13.8×3.8	T0	10.5
	SBF, SBAM, SBH, SBA 350–1.5GB–AL68(※※)N※	1.5×3.1	9.8×4.3	N6	6.8
	SBF, SBAM, SBH, SBA 350–2GB–AL0(※※)N※	2.0×3.1	14.4×4.4	N1、N3、N4、N6、	10.5
	SBF, SBAM, SBH, SBA 350–2GB–AL5.5(※※)N※	2.0×2.8	8.9×3.8	N8、T0、T2、T6、T8	5.5
	SBF, SBAM, SBH, SBA 350–2GB–AL6(※※)N※	2.0×2.8	9.4×3.8	N6	6.0
	SBF, SBAM, SBH, SBA 350–2GB–AL7(※※)N※	2.0×3.1	10.8×4.4	N0、N2、N6、T0、T4、T6	7.0
	SBF, SBAM, SBH, SBA 350–3GB–AL0(※※)N※	3.0×2.9	15.4×4.2	N0、N2、N6、T0、T5	10.5
	SBF, SBAM, SBH, SBA 350–3GB–AL12(※※)N※	3.0×2.9	16.9×4.2	N2、N6、T0	12.0
	SBF, SBAM, SBH, SBA 350–3GB–AL13(※※)N※	3.2×4.2	19.0×5.6	T0	13.2
	SBF, SBAM, SBH, SBA 350–3GB–AL15(※※)N※	3.0×2.7	20.0×4.1	N2、N4、N8、T0、T2、T4	15.0
	SBF, SBAM, SBH, SBA 750–3GB–AL0(※※)N※	3.0×3.5	15.2×4.3	N8	10.5
	SBF, SBAM, SBH, SBA 750–3GB–AL12(※※)N※	3.0×3.5	16.7×4.3	T0	12.0
	SBF, SBAM, SBH, SBA 750–3GB–AL14(※※)N※	3.0×3.5	18.7×4.2	N0	14.0
	SBF, SBAM, SBH, SBA 500–2GB–BL8(※※)N※	2.1×5.3	11.3×6.3	N0	8.0
	SBF, SBAM, SBH, SBA 500–3GB–BL7(※※)N※	3.0×4.1	12.0×5.5	T0	7.1
	SBF, SBAM, SBH, SBA 500–4GB–BL7(※※)N※	3.4×4.1	13.0×5.5	N6	7.2
	SBF, SBAM, SBH, SBA 750–2GB–BL12.8(※※)N※	2.5×5.2	16.9×6.0	N0	12.8
	SBF, SBAM, SBH, SBA 1000–2GB–BL6(※※)N※	2.5×5.0	10.1×6.0	N6	6.0
	SBF, SBAM, SBH, SBA 1000–3GB–BL7(※※)N※	3.0×5.5	11.7×6.5	N8、T4	7.0
	SBF, SBAM, SBH, SBA 350–2GB–CL0(※※)N※	2.5×3.3	14.7×4.5	N6、N8、T0、T8	10.5
	SBF, SBAM, SBH, SBA 350–2GB–CL8(※※)N※	2.5×3.3	12.9×4.5	T2、T4	8.0
	SBF, SBAM, SBH, SBA 350–3GB–CL15(※※)N※	3.0×2.8	20.0×4.1	N2、T1、T2、T4	15.0

SBF, SBAM, SBHB, SBA series strain gages

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SBF, SBAM, SBH, SBA 120–（10）KA(※※)	Φ8.9	Φ10.0		
	SBF, SBAM, SBH, SBA 350–（10）KA(※※)	Φ9.0	Φ10.0	T0、T2、T6	
	SBF, SBAM, SBH, SBA 350–（13）KA(※※)	Φ12.0	Φ13.0		
	SBF, SBAM, SBH, SBA 350–（8）KA(※※)	Φ7.4	Φ8.0		
	SBF, SBAM, SBH, SBA 350–（9）KA(※※)	Φ9.4	Φ10.0		
	SBF, SBAM, SBH, SBA 350–（12）KA(※※)	Φ11.4	Φ12.0		
	SBF, SBAM, SBH, SBA 350–（14）KA(※※)	Φ12.8	Φ14.0	T0、N3、N6	
	SBF, SBAM, SBH, SBA 350–（15）KA(※※)	Φ14.0	Φ15.0		
	SBF, SBAM, SBH, SBA 350–（20）KA(※※)	Φ18.6	Φ20.0		
	SBF, SBAM, SBH, SBA 350–（8.5）KA–B(※※)	Φ8.1	Φ9.0		
	SBF, SBAM, SBH, SBA 350–（18）KA–B(※※)	Φ16.6	Φ18.0		
	SBF, SBAM, SBH, SBA 350–（20）KA–C(※※)	Φ19.0	Φ20.0		
	SBF, SBAM, SBH, SBA 350–（22）KA–C(※※)	Φ19.8	Φ22.2	N4、T0	
	SBF, SBAM, SBH, SBA 120–(10–B13)KA(※※)	Φ9.0	Φ13.0		
	SBF, SBAM, SBH, SBA 350–(7–B10)KA(※※)	Φ6.4	Φ9.9		
	SBF, SBAM, SBH, SBA 350–2EB(※※)N※	2.3×2.7	8.6×7.2	N2	
	SBF, SBAM, SBH, SBA 350–2EB–B(※※)N※	2.3×2.8	8.6×7.4	N2	
	SBF, SBAM, SBH, SBA 350–2FG–L8.8(※※)N※	2.0×2.7	14.5×6.5	N6	8.8
	SBF, SBAM, SBH, SBA 350–2FG–L0(※※)N※	2.0×2.7	16.2×6.5	N2、T2	10.5

SBF, SBAM, SBHB, SBA series strain gages

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SBF, SBAM, SBH, SBA 350-2FG-AL6(※※)N※	2.0×2.2	12.0×7.1	N2、T0、T4、T8	6.0
	SBF, SBAM, SBH, SBA 350-3FG-AL6(※※)N※	3.0×2.1	13.0×6.8	T4	6.0
	SBF, SBAM, SBH, SBA 350-3FG-AL0(※※)N※	3.1×3.0	17.9×8.4	N2、T2、T6	10.5
	SBF, SBAM, SBH, SBA 350-3FG-AL14(※※)N※	3.0×2.1	20.5×6.8	N6、T1、T6、T0	14.0
	SBF, SBAM, SBH, SBA 350-1FG-BL0(※※)N※	1.5×2.7	13.7×6.9	T4、T6	10.5
	SBF, SBAM, SBH, SBA 350-2FG-BL10(※※)N※	2.6×2.7	14.8×8.0	N8	10.0
	SBF, SBAM, SBH, SBA 350-3FG-BL0(※※)N※	3.1×2.8	15.5×6.8	T2	10.5
	SBF, SBAM, SBH, SBA 350-2FG-CL6(※※)N※	2.1×2.9	9.8×6.9	T0、T2、T4	6.0
	SBF, SBAM, SBH, SBA 350-3FG-CL0(※※)N※	3.1×2.8	15.3×7.0	N2、N6、T0、T4	10.5
	SBF, SBAM, SBH, SBA 350-1FG-DL0(※※)N※	1.5×2.5	13.9×6.6	T0、T0、T8	10.5
	SBF, SBAM, SBH, SBA 350-3FG-DL15(※※)N※	2.8×2.3	19.0×6.0	T0	15.0

Note:

1.N※ or T ※stands for creep code. Different creep codes have different creep value.

2.L※ stands for grid interval codes. For example, L0 refers to 10.5mm grid interval; L6 refers to 6.0mm grid interval.

3.In the above list, BF (BAM, BHB, BA) 350–3AA (※※) represents four series of strain gages, which are BF350–3AA (※※), BAM350–3AA (※※), BHB350–3AA (※※) and BA350–3AA (※※) respectively. Please specify the appropriate models on your purchase order.

4.For the encapsulated gages with grid pattern HA–D and HA–E, we only offer the gages with lead wires.

5.For strain gages with KA patterns:

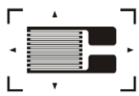
When standard value=120Ω, resistance range: standard value+2.0/–1.0Ω, resistance difference of the grids≤0.4Ω.

When standard value=350Ω, resistance range: standard value+2.0/–2.0Ω, resistance difference of the grids≤0.8Ω.

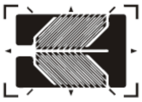
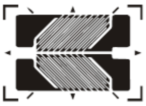
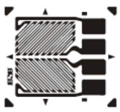
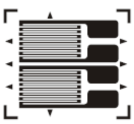
6. for stain gages with FG, EB patterns, when standard value=350Ω, resistance range: 350±50Ω, zero balance≤0.5m V/V.

7. Except for the models listed in above table, we also can produce high precision transducers that use strain gauges with any shape and size according to samples or drawings supplied by customers.

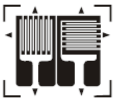
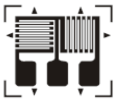
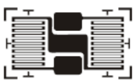
SZM, SZAM series strain gages

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SZF, SZAM 175-1AA(※※)N※	1.0×1.8	4.5×3.0	T8	
	SZF, SZAM 300-1AA(※※)N※	1.1×1.2	3.6×2.2	T8	
	SZF, SZAM 200-1AA-W(※※)N※	1.0×0.5	2.8×1.8	T8	
	SZF, SZAM 250-1AA-W(※※)N※	1.1×1.0	2.9×2.0	T8	
	SZF, SZAM 300-2AA-W(※※)N※	2.0×1.0	3.8×2.0	T8	
	SZF, SZAM 300-2AA-A-W(※※)N※	2.0×2.0	3.8×2.8	T8	
	SZF, SZAM 350-1AA-W(※※)N※	1.1×1.0	2.9×2.0	T8	
	SZF, SZAM 350-2AA-W(※※)N※	2.0×1.0	3.8×2.0	T8	
	SZF, SZAM 300-3AA-A(※※)N※	2.9×1.9	5.5×2.5	T4	
	SZF, SZAM 350-2AA(※※)N※	1.9×2.8	5.7×4.0	N0、N1、N3、N4、N6、N8、T0、T4、T6	
	SZF, SZAM 350-3AA(※※)N※	3.1×2.6	7.0×3.8	N1、N2、N3、N4、N5、N6、N0、T0、T2、T4	
	SZF, SZAM 350-4AA(※※)N※	4.0×2.5	8.0×3.9	N6	
	SZF, SZAM 350-5AA(※※)N※	5.0×2.3	9.0×3.7	N6	
	SZF, SZAM 350-7AA(※※)N※	7.0×2.6	10.8×4.0	N4	
	SZF, SZAM 1000-1.2AA(※※)N※	1.2×3.6	4.5×4.5	T8	
	SZF, SZAM 1000-1.5AA-A(※※)N※	1.5×2.5	4.5×3.1	T4、T8	
	SZF, SZAM 1000-1.5AA(※※)N※	1.5×4.0	4.9×4.8	N3、N6、T1、T2、T3、T4、T5、T6、T8	
	SZF, SZAM 1000-2AA-T(※※)N※	2.1×3.3	5.8×4.5	N0、T4、T8	
	SZF, SZAM 1000-2AA(※※)N※	2.5×3.3	6.4×4.5	N0、N2、N5、N6、T0、T1、T2、T3、T4、T6	
	SZF, SZAM 1000-3AA-B(※※)N※	3.0×3.1	14.3×4.5	N0、N1、N2、N3、N5、N6、N7、T2、T3、T4、T8	
	SZF, SZAM 1000-3AA(※※)N※	3.2×3.2	7.4×4.5	N0、N1、N2、N3、N4、N6、N8、T0、T2、T3、T4、T5、T6、T8	
	SZF, SZAM 1000-4AA(※※)N※	3.8×2.2	8.2×4.2	N0、N2、N6、N9、T6	
	SZF, SZAM 1000-5AA(※※)N※	5.0×2.9	9.3×4.5	N0、N1、N2、N3、N4、N6、N8、T0、T2	
	SZF, SZAM 1500-3AA(※※)N※	3.2×3.2	7.4×4.5	N6、N4	
	SZF, SZAM 2000-2AA-A(※※)N※	2.1×4.2	5.4×5.2	T1、T6	
	SZF, SZAM 2000-3AA(※※)N※	3.2×4.0	7.4×5.3	N0、T4	
	SZF, SZAM 2000-4AA(※※)N※	4.0×4.4	8.6×6.0	N6	
	SZF, SZAM 2500-3AA(※※)N※	3.2×3.2	7.4×4.5	N2、N6、N8、T0、T1、T2、T3、T4、T5、T6、T7、T8	
	SZF, SZAM 2500-6AA(※※)N※	6.0×6.4	11.0×8.0	N0	
	SZF, SZAM 3000-5AA(※※)N※	5.2×4.0	8.7×5.2	N6	
	SZF, SZAM 3000-6AA(※※)N※	6.1×3.9	9.8×5.2	T0、T4	
	SZF, SZAM 5000-3AA(※※)N※	3.2×4.6	6.7×5.8	N6	

SZM, SZAM series strain gages

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SZF, SZAM 350-2HA(※※)N※	1.9×2.2	6.0×4.9	T0	
	SZF, SZAM 350-3HA(※※)N※	3.0×4.4	9.4×6.5	N1、N4、N8	
	SZF, SZAM 350-4HA(※※)N※	3.7×2.0	7.9×7.9	N3	
	SZF, SZAM 700-4HA(※※)N※	3.8×4.2	9.0×7.8	N5	
	SZF, SZAM 1000-3HA(※※)N※	3.0×4.5	9.4×6.5	N0、N1、N2、N3、N4、N5、N6、 N7、N8、N9、T0、T2、T3、T4、T8	
	SZF, SZAM 1000-4HA(※※)N※	3.8×4.2	9.0×7.8	N4、N6、T0、T4	
	SZF, SZAM 2000-3HA(※※)N※	3.0×5.5	9.9×6.2	N4、N8、T2、T6、T8	
	SZF, SZAM 350-3HA-A(※※)N※	3.0×4.4	9.4×6.5	N4、N6、N8、T0	
	SZF, SZAM 650-3HA-A(※※)N※	2.9×4.0	8.5×6.3	T0	
	SZF, SZAM 1000-3HA-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	
	SZF, SZAM 1000-4HA-A(※※)N※	3.8×4.2	9.0×7.8	N4	
	SZF, SZAM 200-05HA-W(※※)N※	0.5×1.4	3.8×2.0	T4	
	SZF, SZAM 250-1HA-W(※※)N※	1.0×1.3	3.8×2.8	T4	
	SZF, SZAM 300-2HA-W(※※)N※	2.0×1.2	4.0×4.0	T8	
	SZF, SZAM 350-1HA-W(※※)N※	1.0×1.3	3.8×2.8	T4	
	SZF, SZAM 350-2HA-W(※※)N※	2.0×1.2	4.0×4.0	T8	
	SZF, SZAM 350-4HA-D(※※)N※	3.9×2.3	8.3×8.3	N8	
	SZF, SZAM 650-4HA-D(※※)N※	3.8×2.5	7.5×7.5	N1、N8、T0	
	SZF, SZAM 700-4HA-D(※※)N※	3.8×2.5	7.5×7.5	N1、N8、T0	
	SZF, SZAM 700-4HA-E(※※)N※	3.8×2.5	7.5×7.5	N1、N8、T0	
	SZF, SZAM 1000-2HA-T(※※)N※	2.7×3.5	7.1×6.4	T0	
	SZF, SZAM 350-3AB(※※)N※	3.0×3.0	8.0×5.2	N8	
	SZF, SZAM 1000-3AB(※※)N※	3.0×3.0	8.2×5.1	N0、N1、N2、N4、N5 N6、N8、T0、T6	
	SZF, SZAM 1000-4AB(※※)N※	4.0×4.0	9.1×5.8	N8	
	SZF, SZAM 350-3FB(※※)N※	3.0×2.6	7.4×7.2	N6	
	SZF, SZAM 350-4FB(※※)N※	4.0×2.4	7.8×6.2	N6、N2	
	SZF, SZAM 1000-2FB(※※)N※	2.1×2.8	6.4×7.6	N6、T0	
	SZF, SZAM 1000-3FB(※※)N※	3.2×2.8	7.4×7.4	N0、N1、N2、N3、N4、N5、 N6、N8、T0、T2、T4、T8	
	SZF, SZAM 1000-4FB(※※)N※	4.0×2.4	7.8×6.2	N6、T0	
	SZF, SZAM 1000-6FB(※※)N※	6.0×2.4	9.5×6.8	N2	

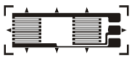
SZM, SZAM series strain gages

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SZF, SZAM 1000-2BB(※※)N※	2.0×2.6	7.2×6.0	N8	
	SZF, SZAM 1000-3BB(※※)N※	3.0×3.4	8.6×6.6	T4	
	SZF, SZAM 1000-6BB(※※)N※	6.0×6.0	13.8×9.7	T0	
	SZF, SZAM 350-2BB-A(※※)N※	1.5×2.0	5.9×4.5	T0	
	SZF, SZAM 800-2BB-A(※※)N※	1.7×3.2	5.4×5.4	T0	
	SZF, SZAM 1000-2BB-A(※※)N※	2.0×2.7	6.9×6.0	T4、N0	
	SZF, SZAM 1000-2BB-A(※※)-KR	2.6×2.2	5.4×5.4	N4	
	SZF, SZAM 1000-3BB-A(※※)N※	3.0×3.4	9.8×6.8	N2	
	SZF, SZAM 350-1GB-AL68(※※)N※	1.5×3.2	9.8×4.3	N0、N6、T0、T4	6.8
	SZF, SZAM 350-2GB-AL7(※※)N※	2.0×2.7	10.8×3.9	N2、N4、N6、T0	7.0
	SZF, SZAM 350-1GB-AL8(※※)N※	1.5×3.5	11.0×4.3	N2	8.0
	SZF, SZAM 350-2GB-AL0(※※)N※	2.0×2.7	14.4×3.9	N0、N2、N4、N6、T0、T2、T8	10.5
	SZF, SZAM 350-2GB-AL12(※※)N※	2.0×2.7	15.8×3.9	N0、N4	12.0
	SZF, SZAM 350-2GB-AL15(※※)N※	2.0×2.7	18.8×3.9	N2、T4	15.0
	SZF, SZAM 750-2GB-AL12(※※)N※	2.0×3.3	15.8×4.5	N0、T6、T8	12.0
	SZF, SZAM 1000-1.5GB-AL5.5(※※)N※	1.5×2.5	9.1×4.3	N6	5.5
	SZF, SZAM 1000-1.5GB-AL9(※※)N※	1.5×4.0	12.0×5.2	T2、T3、T8	9.0
	SZF, SZAM 1000-1.6GB-AL0(※※)N※	1.6×3.9	13.7×5.1	T1、T4	10.5
	SZF, SZAM 1000-2GB-AL5(※※)N※	2.0×3.3	8.9×4.5	N2	5.3
	SZF, SZAM 1000-2GB-AL5.5(※※)N※	2.0×2.8	8.9×3.8	N6	5.5
	SZF, SZAM 1000-2GB-AL6(※※)N※	2.0×2.8	9.4×3.8	N0、N2、N6、T0、T4、T6	6.0
	SZF, SZAM 1000-2GB-AL7(※※)N※	2.0×3.1	10.8×4.4	N0、N2、N4、N6、T0、T5	7.0
	SZF, SZAM 1000-2GB-AL0(※※)N※	2.5×3.3	14.7×4.5	N0、N2、N3、N4、N5、N6、N8、T1、T6	10.5
	SZF, SZAM 1000-3GB-AL7(※※)N※	3.0×3.2	11.6×4.4	N2	7.0
	SZF, SZAM 1000-3GB-AL0(※※)N※	3.0×3.2	15.4×4.4	N6、T0、T2、T4、T6、T8	10.5
	SZF, SZAM 1000-3GB-AL14(※※)N※	2.9×3.0	18.7×4.2	N0、N1	14.0
	SZF, SZAM 1100-2GB-AL6(※※)N※	2.0×3.0	9.4×4.0	N2	6.0
	SZF, SZAM 2000-2GB-AL0(※※)N※	2.5×4.0	14.7×5.0	T0、T4	10.5
	SZF, SZAM 500-2GB-BL6(※※)N※	2.1×5.0	9.8×6.0	N4	6.0
	SZF, SZAM 1000-1GB-BL6(※※)N※	1.5×4.8	9.1×6.5	T6	6.0
	SZF, SZAM 1000-2GB-BL6(※※)N※	2.1×4.1	9.7×5.5	N0、N2、N6、T0、T1、T2、T3、T4、T5、T6	6.0
	SZF, SZAM 1000-2GB-BL7(※※)N※	2.1×4.1	10.7×5.5	N6、T1、T3、T5、T8	7.0
	SZF, SZAM 1000-2GB-BL0(※※)N※	2.1×4.1	14.2×5.5	T1、T3、T5	10.5
	SZF, SZAM 1000-3GB-BL6(※※)T※	3.0×3.6	10.7×4.8	T0、T2	6.0
	SZF, SZAM 2000-2GB-BL6(※※)N※	2.1×4.2	9.7×5.5	T6	6.0
	SZF, SZAM 2000-2GB-BL7(※※)N※	2.1×5.4	10.8×6.4	N6、T0	7.0

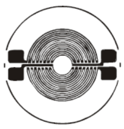
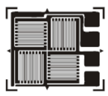
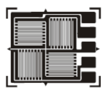
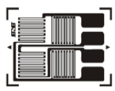
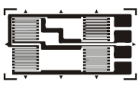
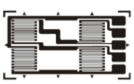
StrainSense

making sense with sensors

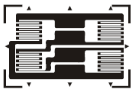
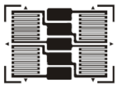
SZM, SZAM series strain gages

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SZF, SZAM 1000-2GB-CL8(※※)N※	2.5×3.3	12.9×4.5	N2、T1、T2、T4	8.0
	SZF, SZAM 1000-2GB-CL0(※※)N ※	2.5×3.3	14.7×4.5	T2、T4	10.5
	SZF, SZAM 350-3GB-L12(※※)N※	3.0×3.3	20.3×4.2	N6	12.0
	SZF, SZAM 500-3GB-L0(※※)N※	3.0×4.8	18.8×5.3	N6	10.5
	SZF, SZAM 500-3GB-L12(※※)N※	3.0×4.8	16.8×5.3	N6	12.0
	SZF, SZAM 1000-2GB-L6(※※)N※	2.1×3.4	11.7×5.2	T4	6.0
	SZF, SZAM 1000-3GB-L6(※※)N※	3.0×3.8	13.2×4.8	T8	6.0
	SZF, SZAM 1000-3GB-L0(※※)N※	3.0×3.8	17.2×4.9	N2、T2、T8	10.5
	SZF, SZAM 1000-3GB-L12(※※)N※	3.1×3.9	18.5×4.9	N2	12.0
	SZF, SZAM 1000-4GB-L12(※※)N※	4.0×2.5	19.5×4.5	N8	12.0
	SZF, SZAM 2000-3GB-L0(※※)N※	3.0×2.8	17.8×4.4	T8	10.5
	SZF, SZAM 350-(14)KA(※※)	Φ12.8	Φ14.0		
	SZF, SZAM 350-(20)KA(※※)	Φ19.0	Φ20.0		
	SZF, SZAM 1000-(14)KA(※※)	Φ12.8	Φ14.0	N6、N3、T0	
	SZF, SZAM 1000-(15)KA(※※)	Φ14.0	Φ15.0		
	SZF, SZAM 1000-(20)KA(※※)	Φ18.6	Φ20.0		
	SZF, SZAM 2000-(14)KA(※※)	Φ13.2	Φ14.0	T0、T4	
	SZF, SZAM 2000-(15)KA(※※)	Φ14.2	Φ15.0		
	SZF, SZAM 3000-(14)KA(※※)	Φ13.2	Φ14.0		
	SZF, SZAM 350-(6.5)KA(※※)	Φ5.3	Φ6.5		
	SZF, SZAM 350-(9)KA(※※)	Φ9.4	Φ10.0		
	SZF, SZAM 350-(25)KA(※※)	Φ23.4	Φ25.0		
	SZF, SZAM 1000-(10)KA(※※)	Φ9.0	Φ10.0	T0、T2、T6	
	SZF, SZAM 1000-(13)KA(※※)	Φ12.0	Φ13.0		
	SZF, SZAM 1500-(10)KA(※※)	Φ9.0	Φ10.0		
	SZF, SZAM 1500-(11)KA(※※)	Φ10.0	Φ10.8		
	SZF, SZAM 2000-(17)KA(※※)	Φ16.0	Φ17.0		
	SZF, SZAM 2000-(18)KA(※※)	Φ17.0	Φ18.0		
	SZF, SZAM 2500-(20)KA(※※)	Φ19.0	Φ20.0		
	SZF, SZAM 350-(6-B10)KA(※※)	Φ6.4	Φ10.0		
	SZF, SZAM 420-(7-B10)KA(※※)	Φ6.4	Φ9.9		
	SZF, SZAM 1200-(7-B10)KA(※※)	Φ6.4	Φ9.9		
	SZF, SZAM 1000-(10-B13)KA(※※)	Φ9.0	Φ13.0		
	SZF, SZAM 1000-(7-B10)KA(※※)	Φ6.4	Φ9.9		
	SZF, SZAM 1000-(7-B9)KA(※※)	Φ6.4	Φ8.7		
	SZF, SZAM 1650-(10-B13)KA(※※)	Φ9.4	Φ13.0		
	SZF, SZAM 2000-(10-B13)KA(※※)	Φ9.4	Φ13.0		

SZM, SZAM series strain gages

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SZF, SZAM 350-(6)KA-B(※※)	Φ5.3	Φ6.0		
	SZF, SZAM 350-(8-B10)KA-B(※※)	Φ8.0	Φ10.0		
	SZF, SZAM 500-(6)KA-B(※※)	Φ5.3	Φ6.0		
	SZF, SZAM 550-(6)KA-B(※※)	Φ5.3	Φ6.0		
	SZF, SZAM 550-(6-B10)KA-B(※※)	Φ5.3	Φ9.8		
	SZF, SZAM 700-(6)KA-B(※※)	Φ5.4	Φ6.0		
	SZF, SZAM 1000-(10)KA-B(※※)	Φ9.0	Φ10.0		
	SZF, SZAM 2000-(12)KA-B(※※)	Φ11.2	Φ12.0		
	SZF, SZAM 350-(8)KA-C(※※)	Φ8.2	Φ8.0		
	SZF, SZAM 350-(10)KA-C(※※)	Φ9.2	Φ10.0		
	SZF, SZAM 350-(20)KA-C(※※)	Φ19.0	Φ20.0		
	SZF, SZAM 350-(22)KA-C(※※)	Φ20.0	Φ22.0		
	SZF, SZAM 750-(20)KA-C(※※)	Φ19.0	Φ20.0		
	SZF, SZAM 1000-(20)KA-C(※※)	Φ19.0	Φ20.0		
	SZF, SZAM 1500-(13-B16)KA-C(※※)	Φ13.2	Φ16.0		
	SZF, SZAM 2000-(13-B16)KA-C(※※)	Φ13.3	Φ16.0		
	SZF, SZAM 1000-(11)KB(※※)	Φ6.7	Φ11.0	T0、T2	
	SZF, SZAM 350-2EB(※※)N※	1.8×2.2	7.4×8.5	N2	
	SZF, SZAM 1000-2EB(※※)N※	2.3×2.7	8.6×7.2	N2	
	SZF, SZAM 1000-3EB(※※)N※	2.7×3.2	9.8×8.4	N2	
	SZF, SZAM 350-2EB-A(※※)N※	1.8×2.3	7.4×8.4	N2	
	SZF, SZAM 1000-2EB-A(※※)N※	2.3×2.7	8.6×7.5	N2	
	SZF, SZAM 1000-2EB-BT(※※)N※	1.8×1.8	7.9×5.2	T6	
	SZF, SZAM 1200-2EB-BT(※※)N※	1.8×1.8	7.9×5.2	T6	
	SZF, SZAM 350-1FG-L0(※※)N※	1.5×2.0	16.0×6.2	T0	10.5
	SZF, SZAM 350-2FG-L7(※※)N※	2.0×1.9	13.4×6.4	T1	7.0
	SZF, SZAM 350-2FG-L8(※※)N※	2.0×1.9	14.3×6.4	T0	8.0
	SZF, SZAM 1000-3FG-L0(※※)N※	3.0×2.5	17.4×6.4	N6、T8	10.5
	SZF, SZAM 1000-3FG-L12(※※)N※	3.1×2.3	18.6×6.8	N0、T8	12.0
	SZF, SZAM 350-2FG-AL6(※※)N※	2.0×2.2	11.9×7.1	T0、N4、N6、N8、T4	6.0
	SZF, SZAM 350-3FG-AL0(※※)N※	3.0×2.0	17.2×6.6	N6	10.5
	SZF, SZAM 1000-2FG-AL0(※※)N※	2.1×2.6	16.9×7.4	T1、T6、T8	10.5
	SZF, SZAM 1000-3FG-AL0(※※)N※	3.1×3.2	17.9×8.4	N2、N6、T0、T2、T4、T6	10.5
	SZF, SZAM 1000-3FG-AL14(※※)N※	3.0×2.1	20.5×6.8	N6、T1、T6、T0	14.0
	SZF, SZAM 1000-3FG-AL12(※※)N ※	3.1×2.9	19.4×8.4	T8	12.0

SZM, SZAM series strain gages

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SZF, SZAM 350–1FG–BL6(※※)N※	1.5×2.2	9.3×6.1	T0、N4	6.0
	SZF, SZAM 350–1FG–BL0(※※)N※	1.5×2.5	13.9×6.4	N0、T0、T8	10.5
	SZF, SZAM 400–1FG–BL68(※※)N※	1.5×2.4	9.8×6.1	T8	6.8
	SZF, SZAM 500–2FG–BL6(※※)N※	2.1×2.2	9.7×5.8	T8	6.0
	SZF, SZAM 1000–1.5FG–BL0(※※)T※	3.0×2.8	13.8×6.9	T8	10.5
	SZF, SZAM 1000–2FG–BL6(※※)N※	2.1×2.7	9.8×6.9	N4、N8、T0、T4、T8	6.0
	SZF, SZAM 1000–2FG–BL0(※※)N※	2.1×2.8	14.4×6.9	N2、N6	10.5
	SZF, SZAM 1000–3FG–BL0(※※)T※	3.1×2.8	15.5×6.8	T2	10.5
	SZF, SZAM 1100–2FG–BL0(※※)N※	2.1×2.8	14.4×6.9	N2、T8	10.5
	SZF, SZAM 1100–2FG–BL6(※※)N※	2.1×2.8	9.8×6.8	N2	6.0
	SZF, SZAM 1200–3FG–BL7(※※)N※	3.0×2.6	12.0×6.8	T0	7.0
	SZF, SZAM 2000–2FG–BL0(※※)N※	2.0×3.3	14.3×7.8	T8	10.5
	SZF, SZAM 350–1FG–CL6(※※)N※	1.5×2.2	9.2×6.0	T0	6.0
	SZF, SZAM 350–1FG–CL68(※※)N※	1.5×2.4	9.8×6.2	N2	6.8
	SZF, SZAM 350–1FG–CL0(※※)N※	1.5×2.2	13.9×6.4	T2	10.5
	SZF, SZAM 1000–2FG–CL6(※※)N※	2.1×2.9	9.8×6.9	T0、T2、T4	6.0
	SZF, SZAM 1000–3FG–CL0(※※)N※	3.1×2.8	15.3×7.0	N2、N6、T0、T4	10.5
	SZF, SZAM 1100–2FG–CL6(※※)N※	2.1×2.8	9.6×6.8	N2	6.0

Note:

1.N※ or T ※stands for creep code. Different creep codes have different creep value.

2.L※ stands for grid interval codes. For example, L0 refers to 10.5mm grid interval; L6 refers to 6.0mm grid interval.

3.In the above list, ZF (ZAM) 350–3AA (※※) represents two series of strain gages, which are ZF350–3AA (※※) and ZAM350–3AA (※※) respectively. Please specify the appropriate models on your purchase order.

4.For the encapsulated gages with grid pattern HA–D and HA–E, we only offer the gages with lead wires.

5.For strain gages with KA patterns:

When standard value=350Ω, resistance range: standard value+2.0/–2.0Ω, resistance difference of the grids⩽0.8Ω.

When standard value=1000Ω, resistance range: standard value+100.0/–50.0Ω, resistance difference of the grids⩽1.0Ω.

When standard value⩾1500Ω, resistance range: standard value ±10%, resistance difference of the grids⩽standard value 1%.

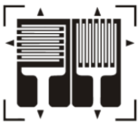
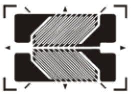
6.for stain gages with FG, EB patterns:

When standard value=350Ω, resistance range: 350±50Ω, zero balance=0.5m V/V.

When standard value=1000Ω, resistance range: 1000±10%, zero balance=1.0m V/V.

7.Except for the models listed in above table, we also can produce high precision transducers that use strain gauges with any shape and size according to samples or drawings supplied by customers.

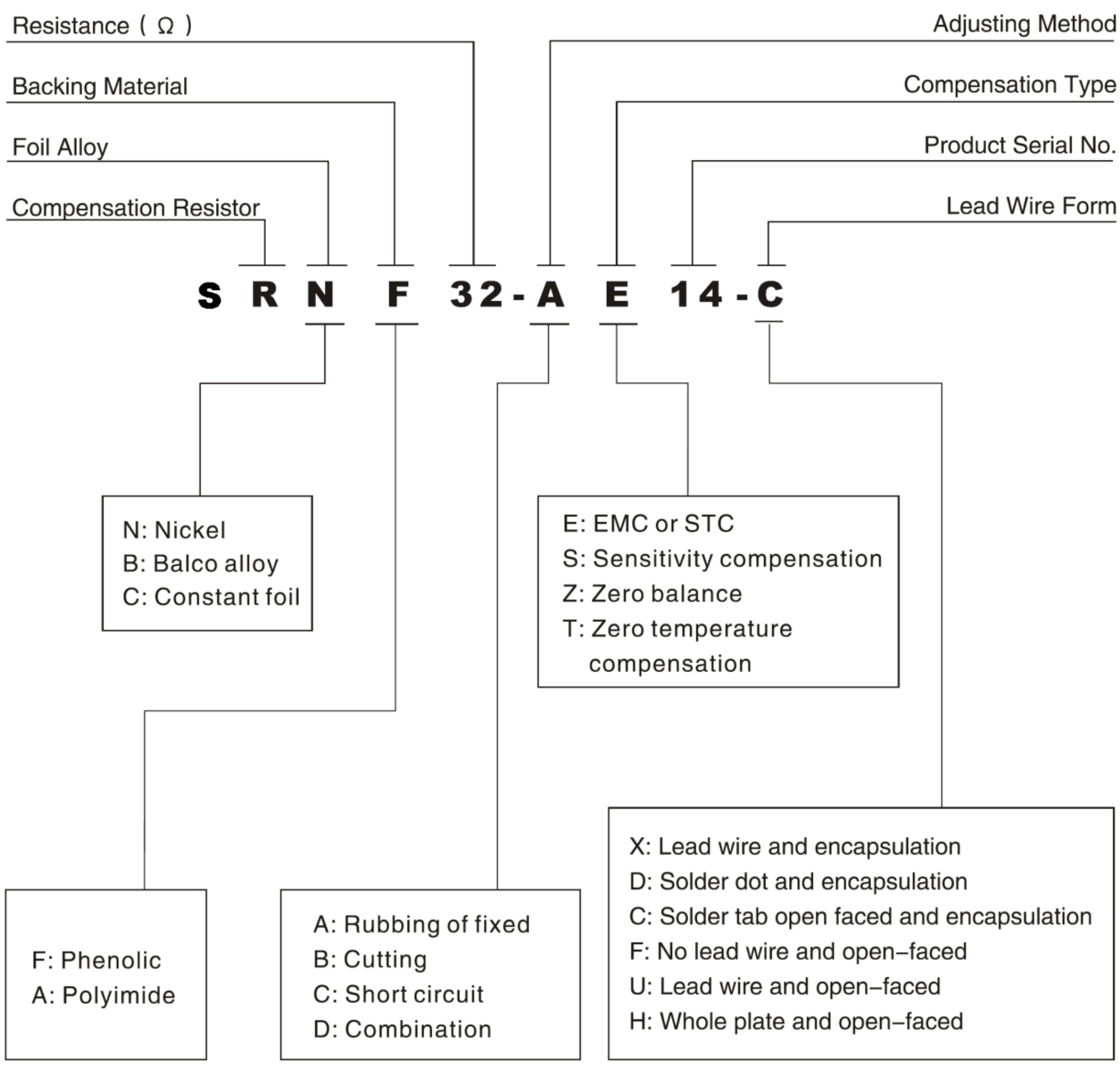
SBAB 250°C series

Strain gage type	Strain gage model	Grid dimension L×W(mm)	Backing dimension L×W(mm)	Creep code	Grid distance (mm)
	SBAB 120-2AA250(※※)	2.1×2.3	5.8×3.8		
	SBAB 120-3AA250(※※)	2.8×2.0	6.4×3.5		
	SBAB 120-4AA250(※※)	8.0×4.0	3.9×2.7		
	SBAB 120-10AA250(※※)	10.0×3.0	15.0×5.0		
	SBAB 350-4AA250(※※)	8.0×4.9	4.0×3.7		
	SBAB 350-5AA250(※※)	9.4×5.7	5.0×4.1		
	SBAB 1000-3AA250(※※)	3.2×3.2	7.4×4.5		
	SBAB 2000-4AA250(※※)	4.0×4.4	8.6×6.0		
	SBAB 120-3BB250(※※)	2.8×3.3	8.5×6.5		
	SBAB 120-4BB250(※※)	4.0×4.4	10.3×7.5		
	SBAB 350-2BB250(※※)	1.9×2.5	6.4×5.5		
	SBAB 350-3BB250(※※)	3.0×3.4	8.8×6.8		
	SBAB 350-4BB250(※※)	4.0×4.3	10.0×7.8		
	SBAB 350-3HA-C250(※※)	3.0×3.8	9.5×7.8		
	SBAB 350-4HA-A250(※※)	4.0×3.6	8.8×7.8		
	SBAB 1000-3HA-A250(※※)	3.0×4.5	9.4×6.5		
	SBAB 250-1HA-W250(※※)	1.0×1.3	3.8×2.8		
	SBAB 300-2HA-W250(※※)	2.0×1.2	4.0×4.0		
	SBAB 350-4HA-D250(※※)	3.9×2.3	8.3×8.3		
	SBAB 350-4HA-E250(※※)	3.9×2.3	8.3×8.3		
	SBAB 350-(10)KA250(※※)	Φ8.8	Φ10.0		
	SBAB 350-(15)KA250(※※)	Φ14.0	Φ15.0		
	SBAB 350-(20)KA250(※※)	Φ18.6	Φ20.0		
	SBAB 1000-(10)KA250(※※)	Φ9.0	Φ10.0		
	SBAB 1000-(20)KA250(※※)	Φ18.6	Φ20.0		
	SBAB 1000-6FB250(※※)	6.0×2.4	9.5×6.8		

Compensation Resistor Designation and Selection

High accuracy transducers not only need to choose high accuracy strain gages but also need to proceed with series compensation and adjustment. R series compensation resistor is a kind of bonded adjustable compensation resistor. It can be used to improve traducers' output sensitivity, sensitivity temperature change, zero output, zero output temperature shifts, etc. technical parameter; furthermore, it has several advantages such as easy bond, convenient adjustment, temperature performance in accordance with the spring element material and high compensation accuracy, etc.

Designation system for compensation resistors



How to choose compensation resistors

During the production of high accuracy transducers, a series of compensation should be done in order to improve the specifications of transducers. Mainly to compensate sensitivity temperature coefficient, sensitivity, zero balance and zero temperature shifts, following is an introduction to each compensation methods and choice of compensation resistors:

(1) Sensitivity temperature compensation (i.e. elastic modulus compensation): usually adopts RNF, RBF series fixed (or combined) compensation resistor. When the transducers environmental temperature changed, the elastic modulus of the spring element and the strain gages' factor will also be changed correspondingly, and the sensitivity of the transducer is changed accordingly that caused the measuring errors. Therefore, high accuracy transducers need to compensate this error. The method is as follows: To connect the compensation resistor in series into the supply excitation circuit, using the characteristic that the resistance will be changed by temperature and the direction is just opposite to the transducer sensitivity changes, to counteract the drift caused by temperature changes, thereby to reach the compensation purpose. The compensation resistance value can be calculated by the formula bellow:

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

R_m refers to the resistance value of compensation resistor, S_1、S_2 refer to temperature T_1 and T_2 transducer sensitivity respectively, R_{in} refers to the bridge input resistance when temperature value is T_1; α_c refers to the resistance temperature coefficient of the compensation resistor (Resistance temperature coefficient of the RNF series compensation resistor is 5.5×10^{-3}/℃, resistance temperature coefficient of the RBF series compensation resistor is 4.3×10^{-3}/℃). Sensitivity S=Eo / V(Eo refers to the bridge output voltage, V refers to the supply excitation voltage). Generally, for steel transducers you can choose RNF series 20Ω compensation resistance, for aluminum transducers you can choose RNF series 32Ω compensation resistance. The specific compensation resistance value should be confirmed through the test, and to adjust according to the transducers' accuracy.

(2) Sensitivity compensation: You can adopt RCF series compensation resistor or thinner wires with lower resistance temperature coefficient. Because the spring element material, machining difference and gage factor combine together (≤1%), transducers sensitivity decentralization would be larger. In order to increase the interchange of transducers, during transducers manufacturing, generally to design the sensitivity a little bit higher than the standard value intentionally, then during machining to adjust it into the standard value according to the test result. The specific method is: To connect the compensation resistor with smaller resistance temperature coefficient into the excitation circuit, to lower down the real excitation voltage of the transducers, so as to decrease transducer's sensitivity. The compensation resistance value can be calculated by the formula bellow:

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

Rc refers to resistance value of the compensation resistor, S_1、S_2 refers to the real sensitivity before connection and standard sensitivity after adjustment respectively, R refers to input resistance of the bridge.

(3) Zero balance compensation: Usually to connect a RCF compensation resistance or managing varnish wrapped wire with lower resistance temperature coefficient into one of the arms in the bridge, to make the transducer's strain gage bridge output close to zero without load, so as to decrease the

measuring error and easy for zero adjustment of the indicator. Usually we use frictional structure, cutter structure and short connection compensation resistors that can adjust bridge zero neatly and easily. Resistance value of frictional compensation resistor could be adjusted through polishing grids with abrasive; Resistance value of cutter compensation resistor could be adjusted through cutting the connection grid; Resistance value of short connection compensation resistor could be adjusted by short connecting the grids. For instance, (Resistor Ra in Fig.5), suppose that strain gages R_1、R_3 get compression strain(negative strain), R_2、R_4 get tensile strain (positive strain). If zero output is positive, a–b terminal resistance should be increased (i.e. increase resistance value by polishing), meanwhile check zero output until output becomes zero. If zero output is negative, then we should increase the resistance value of a–c terminal (i.e. increase the resistance value by polishing), meanwhile check zero output until output becomes zero. We recommend adopting frictional RCF5–AZ04 compensation resistor to adjust zero, fig. 5, Ra is the zero balance compensation resistance.

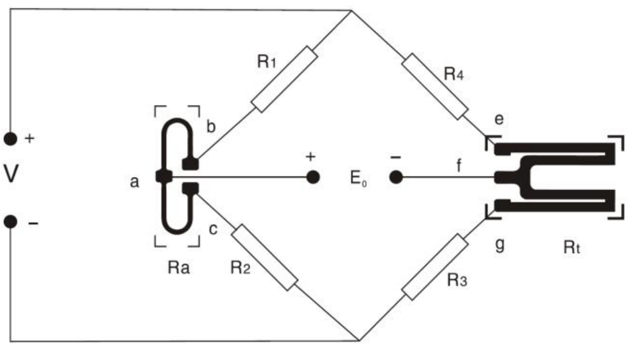


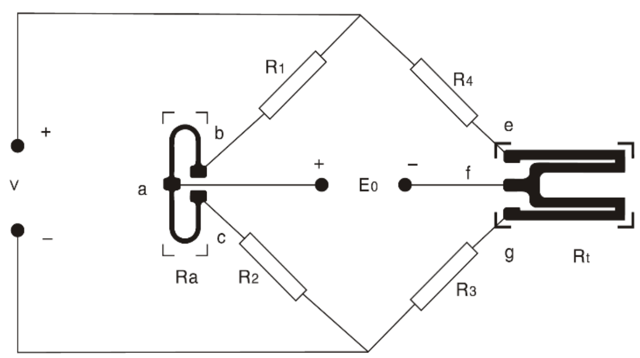
Fig.5 Zero balance compensation

(4) Zero temperature compensation: Usually to decrease the temperature effect on zero output through connecting RNF compensation resistor or varnish wrapped pure copper wire, or varnish wrapped nickel wire with larger resistance temperature coefficient to one of the arms in the bridge. Transducers output is almost zero with no loads, when transducers temperature changes, one side, spring element, bonding adhesive and strain gages will expand or shrink for different extent to cause strain gage resistance changes. Another side, sensitivity grid material resistance temperature coefficient will also cause the strain gage resistance changes. All of these factors will affect transducer's zero output, even to adopt self–temperature compensation strain gages and full bridge connection, due to dispersion of the strain gage temperature performance, the output zero will also be changed more or less, so it needs to be compensated. The specific method is: first to test transducers temperature performance, after you get the rule of the compensation resistance and zero temperature drift, then to adjust the corresponding bridge arm compensation resistance value according to the transducer temperature zero drift value. The compensation resistance value can be calculated by the formula bellow:

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

R_t refers to resistance value of compensation resistor; R refers to bridge resistance; U_{in} refers to the excitation voltage; α_c refers to resistance temperature coefficient of the compensation resistor; U_2, U_1 refer to zero output voltage at temperature T_2, T_1. The compensation of zero temperature we often use the compensated wire or compensated resistance with the structure of frictional type, cutter type and short connection type.

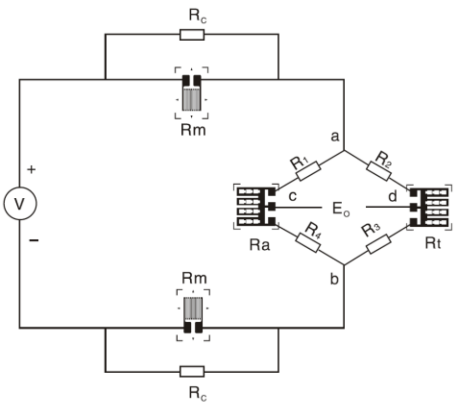
The theory of zero temperature compensation is similar with the zero balance compensation, but it needs to be accomplished during the simulated temperature field. For example (Resistor R_t in picture 6), suppose gages R_1、R_3 get compression strain(negative strain), R_2、R_4 get tensile strain (positive strain). If the zero temperature output is positive (take example of positive temperature, the difference of zero output between positive temperature and normal temperature is called the zero temperature output), so we should increase the resistance in f–g terminal as we calculated. (We can polish it to increase the resistance value), then we can test the temperature zero output and adjust it until the temperature zero output is the same with the start value. If the temperature zero output is negative, we can increase the resistance in e–f terminal (we can polish it to increase the resistance value), then we can test the temperature zero output and adjust it until the temperature zero output is the same with the start value. We recommend the frictional type RNF1–AT02 to adjust the temperature zero output, as shown in picture 10. In the picture, Rt means the compensation resistors of temperature zero.



Picture 6 Zero temperature compensation

Transducer Wiring Compensation Skeleton Drawing

R_1 ~R_4 ------ Strain gages
R_t ------- Zero temperature compensation resistors
R_a ------- Adjustable resistor for zero output
R_m ------- Sensitivity temperature compensation resistors (or elastic modulus compensation resistors)
R_l ------- Linearity compensation resistors
V ------- Excitation voltage
E_0 ------- Bridge output (or measure output)

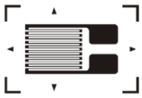
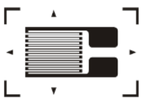


Picture 7 Compensation circuit of transducers

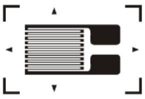
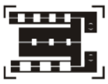
Compensation Resistor Specification

Specification	SRNF series	SRBF series	SRCF series
Resistance tolerance to average resistance(23 ℃)	≤ ±0.5%		
Resistance temperature coefficient	5.5×10^{-3}/℃	4.3×10^{-3}/℃	
Temperature range (℃)	-30 ~ +60		
Adhesive	H-600,H-610,X-602		
Wiring	X(may omit) 、C、D、F、H、U		

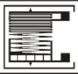
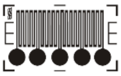
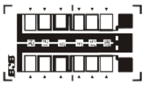
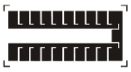
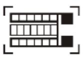
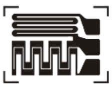
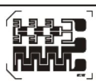
SRBF, SRNF, SRCF series compensation resistor

Strain gage type	Strain gage model	Nominal resistance (Ω)		Backing dimension L×W(mm)
		Initial	Adjusted	
	SRBF 15–AE56	15.0		3.0×2.0
	SRBF 20–AE26	20.0		6.2×3.6
	SRBF 25–AE05	25.0		6.2×3.9
	SRBF 30–AE45	30.0		6.2×4.0
	SRBF 35–AE45	35.0		6.2×4.0
	SRBF 50–AE06	50.0		5.8×3.8
	SRBF 60–AE07	60.0		5.9×3.8
	SRBF 65–AE66	65.0		5.9×3.8
	SRBF 70–AE08	70.0		6.0×3.8
	SRBF 81–AE14	81.0		6.8×4.4
	SRBF 90–AE14	90.0		6.8×4.4
	SRBF 96–AE10	96.0		6.5×4.2
	SRBF 100–AE11	100.0		6.8×4.0
	SRBF 130–AE22	130.0		7.1×4.2
	SRBF 150–AE23	150.0		7.1×4.6
	SRBF 180–AE25	180.0		7.1×4.6
	SRBF 200–AE58	200.0		6.9×4.0
	SRBF 200–AE13	200.0		7.6×4.8
	SRBF 234–AE13	234.0		7.6×4.8
	SRBF 330–AE74	330.0		12.0×6.0
	SRNF 5–AE12	5.0		5.7×4.4
	SRNF 9–AE05	9.0		6.2×3.9
	SRNF 13–AE45	13.0		6.2×4.0
	SRNF 15–AE16	15.0		5.6×3.8
	SRNF 16–AE57	16.0		7.6×4.3
	SRNF 18–AE06	18.0		5.8×3.8
	SRNF 18–AE73	18.0		5.8×3.8
	SRNF 20–AE07	20.0		5.9×3.8
	SRNF 22–AE07	22.0		5.9×3.8
	SRNF 24–AE66	24.0		5.9×3.8
	SRNF 26–AE08	26.0		6.0×3.8

SRBF, SRNF, SRCF series compensation resistor

Strain gage type	Strain gage model	Nominal resistance (Ω)		Backing dimension L×W(mm)
		Initial	Adjusted	
	SRNF 28–AE09	28.0		6.1×4.0
	SRNF 30–AE09	30.0		6.1×4.0
	SRNF 32–AE14	32.0		6.8×4.4
	SRNF 35.5–AE10	35.5		6.5×4.2
	SRNF 40–AE11	40.0		6.8×4.0
	SRNF 42–AE11	42.0		6.8×4.0
	SRNF 50–AE22	50.0		7.1×4.2
	SRNF 54–AE28	54.0		7.1×4.4
	SRNF 55–AE62	55.0		7.2×3.0
	SRNF 60–AE23	60.0		7.1×4.6
	SRNF 64–AE31	64.0		7.1×4.6
	SRNF 65.4–AE25	65.4		7.1×4.6
	SRNF 70–AE25	70.0		7.1×4.6
	SRNF 73–AE25	73.0		7.1×4.6
	SRNF 76–AE13	76.0		7.6×4.8
	SRNF 81–AE13	81.0		7.6×4.8
	SRNF 112–AE59	112.0		8.0×8.0
	SRNF 120–AE61	120.0		6.5×3.9
	SRNF 300–AE64	300.0		8.6×5.3
	SRNF 02–BT18	0.2	1.6	6.4×6.4
	SRNF 05–BE17	1.3	10.0	
	SRNF 02–CT44	0.45	0.07	15.0×9.0
	SRNF 035–AT03	0.65		10.6×5.5
	SRNF 1–AT02	0.9		8.5×5.4
	SRCF2–AZ01	2.0		
	SRNF 3–AT03	0.9		11.5×5.0
	SRCF5–AZ04	5.0		
	SRNF 1–CT41	1.0	0.04	7.6×3.8
	SRNF 5–BE75	6.8	14.0	8.0×5.5
	SRNF 5–CT41	2.0	0.05	8.1×5.9

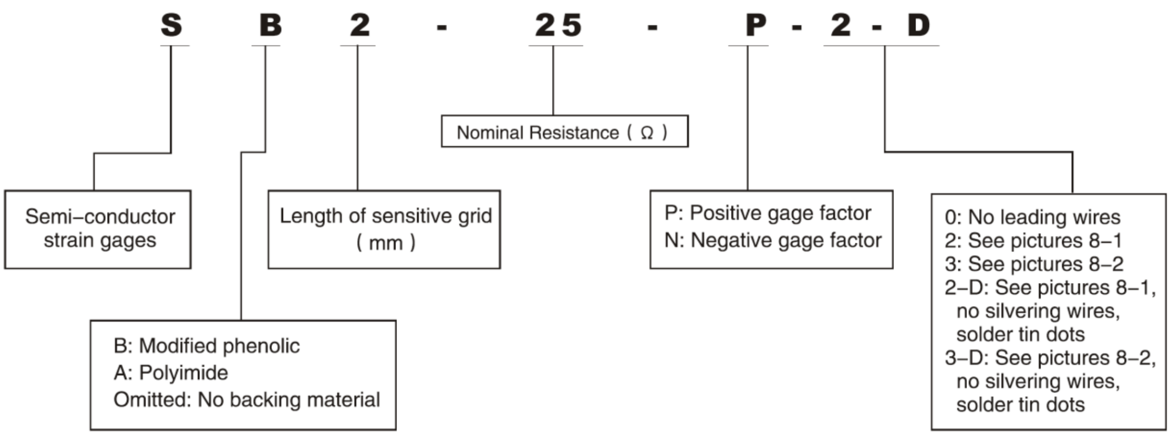
SRBF, SRNF, SRCF series compensation resistor

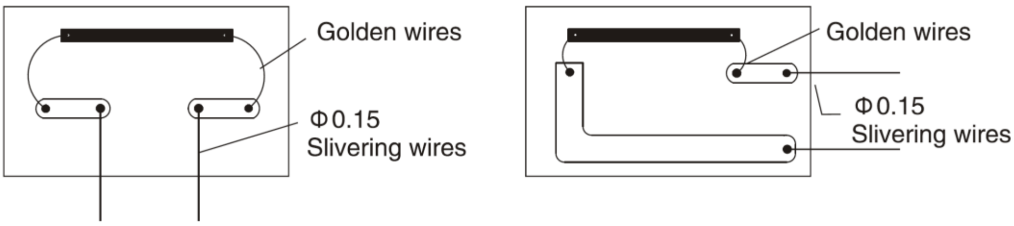
Strain gage type	Strain gage model	Nominal resistance (Ω)		Backing dimension L×W(mm)
		Initial	Adjusted	
	SRNF 9–BE37	9.5	33.0	7.9×7.8
	SRNF 15–BE32	15.0	25.5	8.2×7.3
	SRNF 10–CT41	13.0	2.0	6.4×3.2
	SRCF70–CS41	75.0	6.3	
	SRNF 20–AE15	20.0	20.0	10.4×6.0
	SRBF 4–AT69	3.4		10.0×6.5
	SRCF01–BZ62	17.5	29.0	14.3×7.8
	SRCF02–CS46	5.3	1.0	20.0×10.0
	SRCF1–AZ63	1.0		4.8×1.6
	SRCF1–BS24	2.0	42.5	8.4×8.4
	SRCF5–BS27	6.0	52	8.5×8.5
	SRCF1–CS60	2.3	0.6	7.4×5.4
	SRCF2–AS55	2.6		11.2×5.2
	SRCF2–BS19	2.0	22.0	6.6×3.6
	SRNF 05–BT20	0.3	3.3	
	SRCF5–BS56	55	74	9.4×7.8
	SRCF10–BS3	11.0	36.5	7.7×5.4
	SRCF25–DS61	37.0	16.0	10.5×7.7
	SRCF28–CS47	36.0	8.5	14.0×11.0
	SRCF30–CS42	41.5	8.0	15.0×10.0

Semi-conductor Strain Gages

Semi-conductor strain gages adopt silicon, germanium, antimony steel, gallium phosphide and so on for manufacture material, with large sensitivity factor (large than tinsel strain gage and foil strain gages dozen times, therefore have large signal for output); small transverse effect factor; small mechanical hysteresis; small size, easy to use manufacture tiny transducers.

Designation System for Semi-conductors





Picture 8-1 Picture 8-2

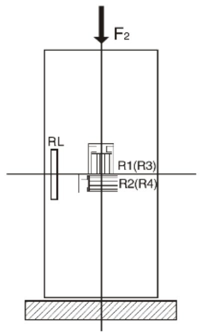
Picture 8 : Pictorial illustration for typical semi-conductor

Linear Compensation Principle

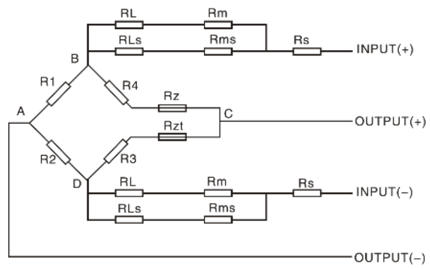
Due to the unbalance of transverse (Poisson Strain) and axial strain of the column or similar structure transducers element, caused the non-linearity error of the bridge output, and because of the non-linearity between load and strain, material non-linearity, transverse load non-linear error, severely affect the accuracy of column and similar structure transducers, therefore we must correct it to meet the requirement of producing high precision transducers.

Non-linear compensation could practice compensation through changing the actual supply voltage of the bridge to compensate transducer linear accuracy. Generally, in the strain area of the column spring element, on the side of strain gage we just bond two pieces of semi-conductor gages symmetrically along with the axle, as for linear compensation resistance RL. Picture 9 shows the bonding area of compensation resistance; connect two pieces of resistance with value of RL/2 symmetrically to the supply bridge. Picture 10 shows the linear compensation bridge and complete bridge circuit.

As we all know, non–linear error for column and similar structure is a digressive parabola. Namely, as the increase of load, output will present digressive trend. After linear compensation, digressive output and increased supply voltage will compensate to each other, therefore the real output will be a straight line.



Picture9 Compensation resistance bonding sketch



Picture10 Linear compensation bridge and complete bridge circuit sketch

Semi–conductor strain gauges

Model	Backing dimension (mm)	Grid dimension (mm)	Resistance value (Ω)	Sensitive coefficient K	Resistance temperature coefficient (1/℃)	Sensitive temperature coefficient (1/℃)	Ultimate working temperature (℃)	Ultimate working current (mA)	Ultimate strain (μ ε)
SB5–15–P–2	6×4	5×0.32×0.05	15	80±5%	<0.06%	<0.10%	<80	20	6000
SB5–25–P–2	6×4	5×0.32×0.05	25	80±5%	<0.06%	<0.10%	<80	20	6000
SB5–30–P–2	6×4	5×0.32×0.05	30	80±5%	<0.06%	<0.10%	<80	20	6000
SB5–60–P–2	6×4	5×0.32×0.05	60	100±5%	<0.08%	<0.12%	<80	15	6000
SB5–120–P–2	6×4	5×0.32×0.05	120	110±5%	<0.15%	<0.15%	<80	15	6000
SB3.8–15–P–2	5×3	3.8×0.24×0.05	15	80±5%	<0.06%	<0.10%	<80	20	6000
SB3.8–30–P–2	5×3	3.8×0.24×0.05	30	80±5%	<0.06%	<0.10%	<80	20	6000
SB3.8–60–P–2	5×3	3.8×0.24×0.05	60	100±5%	<0.08%	<0.12%	<80	15	6000
SB3.8–120–P–2	5×3	3.8×0.24×0.05	120	110±5%	<0.15%	<0.15%	<80	15	6000
SB5 – 15 – P – 2	6×4, 8×4	5×0.32×0.05	15	80±5%	<0.06%	<0.10%	<80	20	6000
SB5 – 30 – P – 2	6×4, 8×4	5×0.32×0.05	30	80±5%	<0.06%	<0.10%	<80	20	6000
SB5 – 60 – P – 2	6×4, 8×4	5×0.32×0.05	60	100±5%	<0.08%	<0.12%	<80	15	6000
SB5 – 120 – P – 2	6×4, 8×4	5×0.30×0.05	120	110±5%	<0.15%	<0.15%	<80	15	6000
SB5 – 350 – P – 2	6×4, 8×4	5×0.28×0.04	350	130±5%	<0.35%	<0.28%	<80	10	6000
SB5 – 1000 – P – 2	6×4, 8×4	5×0.24×0.04	1000	150±5%	<0.40%	<0.30%	<80	5	6000
SB3.8 – 15 – P–2	5×3	3.8×0.24×0.05	15	80±5%	<0.06%	<0.10%	<80	20	6000
SB3.8 – 30 – P–2	5×3	3.8×0.24×0.05	30	80±5%	<0.06%	<0.10%	<80	20	6000
SB3.8 – 60 – P–2	5×3	3.8×0.24×0.05	60	100±5%	<0.08%	<0.12%	<80	15	6000
SB3.8 – 120 – P–2	5×3	3.8×0.24×0.04	120	100±5%	<0.15%	<0.15%	<80	15	6000
SB3.8 – 350 – P–2	5×3	3.8×0.22×0.05	350	130±5%	<0.35%	<0.28%	<80	10	6000
SB3.8 – 1000 – P–2	5×3	3.8×0.22×0.05	1000	150±5%	<0.40%	<0.30%	<80	5	6000