



Index

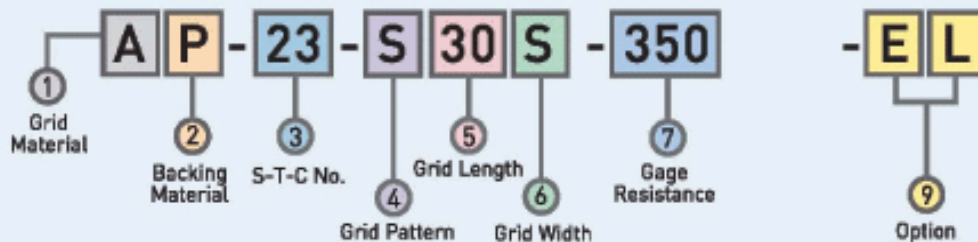
Strain Gauge Application	2
Strain Gauge Coding System	3
Thermal Output Strain	4
Installation of Strain gauge	5
Single Linear type (S series) 120Ω Strain Gauge	6
Single Shear type (Q series) 120Ω Strain Gauge	7
Tee Rosette type (T series) 120Ω Strain Gauge	8
Tee Rosette type (TS series) 120Ω Strain Gauge	9
3-Element Rosette type (R series) 120Ω Strain Gauge	10
3-Element Rosette type (RS series) 120Ω Strain Gauge	11
Strip gauge type (SH series) 120Ω Strain Gauge	12
Strip gauge type (SV series) 120Ω Strain Gauge	13
Single Linear type (S series) 350Ω Strain Gauge	14
Single Shear type (Q series) 350Ω Strain Gauge	15
Double Shear type (T series) 350Ω Strain Gauge	16
Diaphragm type (D series) 350Ω Strain Gauge	17
Full-Bridge type (FB series) 350Ω Strain Gauge	18
Linear type (S series) 1KΩ Strain Gauge	19
Water Proof type 120Ω Strain Gauge	20
High Temperature type 120Ω Strain Gauge	20

Measurements Applications

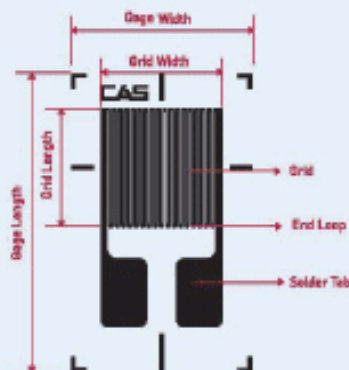


Coding System

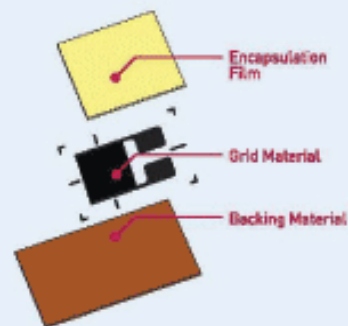
Cas Strain gauges has been manufactured based on international standard of NAS942, OIML and ASTM, and Cas has applied coding system to sort pattern, application, material and resistance of strain gauges.



No	Code	Information
1	A	Grid Material A : Constantan, K : Karma
2	P	Backing Material P : Polyimide film, B : Phenolic resin
3	23	S-T-C No. 11 : Steel, 23 : Aluminum
4	S	Grid Pattern S : Single Linear, T : Tee Rosette, D : Diaphragm, R : 3 elements rosette, Q-Shear
5	30	Grid Length 10(1mm) ~ 900(90mm)
6	S	Grid Width N : Narrow, S : Same, W : Wide (width-length ratio)
7	350	Gage Resistance 120, 350, 700, 1000, 2000, 3000
9	EL	Option E : Encapsulated, L : Lead wire attached, C : Cable attached



Strain Gauge Terminology

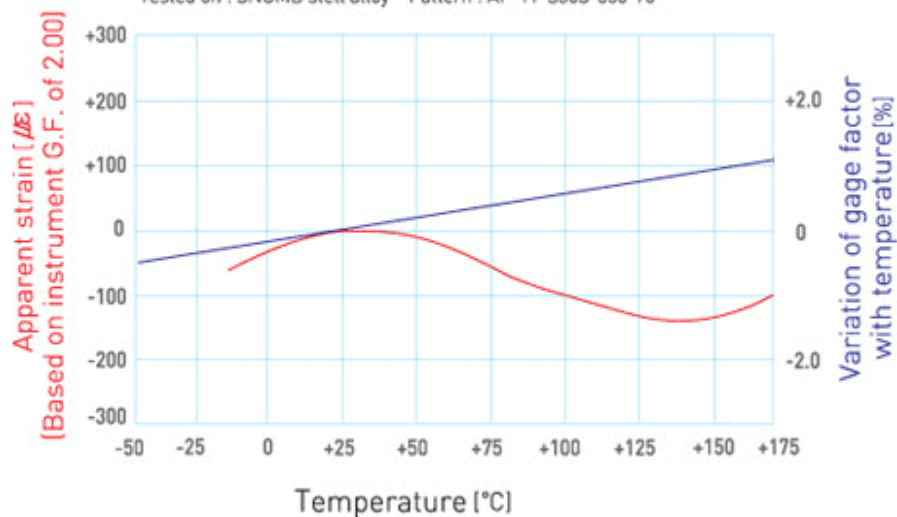


Strain Gauge Structure

Thermal Output Strain

LOT NO.: PA2S06-08-080617-01

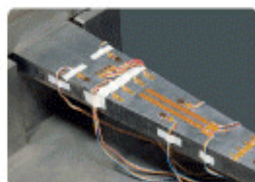
Tested on : SNCMB stell alloy Pattern : AP-11-S30S-350-70



Wheatstone Bridge Output

BRIDGE/STRAIN	DESCRIPTION	OUTPUT EQUATION- E_0/E	BRIDGE/STRAIN	DESCRIPTION	OUTPUT EQUATION- E_0/E
		$\frac{E_0}{E} = \frac{FE \times 10^{-3}}{4 + 2FE \times 10^{-6}}$			$\frac{E_0}{E} = \frac{FE \times 10^{-3}}{2 + FE \times 10^{-6}}$
		$\frac{E_0}{E} = \frac{FE(1+V) \times 10^{-3}}{4 + 2FE(1-V) \times 10^{-6}}$			$\frac{E_0}{E} = \frac{FE(1+V) \times 10^{-3}}{2 + FE(1-V) \times 10^{-6}}$
		$\frac{E_0}{E} = \frac{FE}{2} \times 10^{-3}$			$\frac{E_0}{E} = \frac{FE(1+V) \times 10^{-3}}{2}$
		$\frac{E_0}{E} = \frac{FE}{2} \times 10^{-3}$			$\frac{E_0}{E} = FE \times 10^{-3}$

Applications



Material bending test



Structure test of steel



Robot engineering



에밀레총

Strain Gage Installation



1
Abrading the appliation



2
Marking the appliation



3
Cleaning the appliation



4
Aligning the strain gage



5
Applying the catalyst



6
Dropping the adhesive



7
Pressing the strain gage



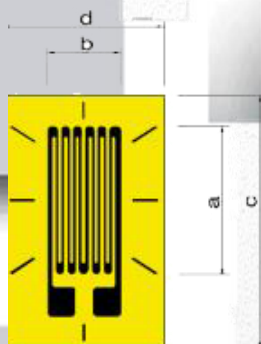
8
Soldering leading-wires of
strain gage to the application



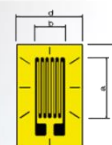
9
Soldering and locking cables



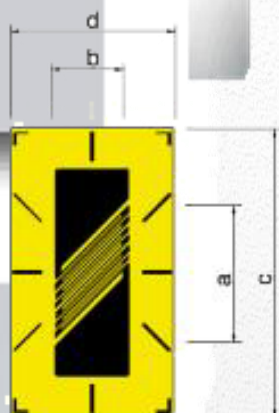
10
Coating the application



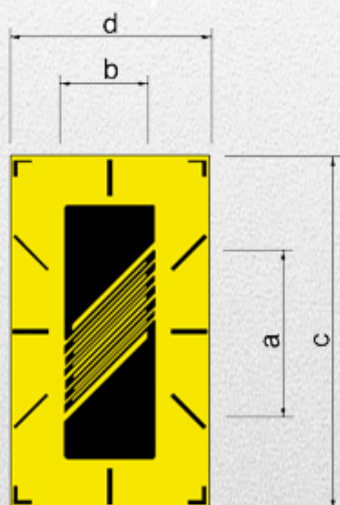
- * Widely used general purpose linear type strain gauge (S series strain gauge)
- * Bending application
- * Grid size : 1 - 90mm
- * Resistance : 120Ω
- * Similar geometry pattern available
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.



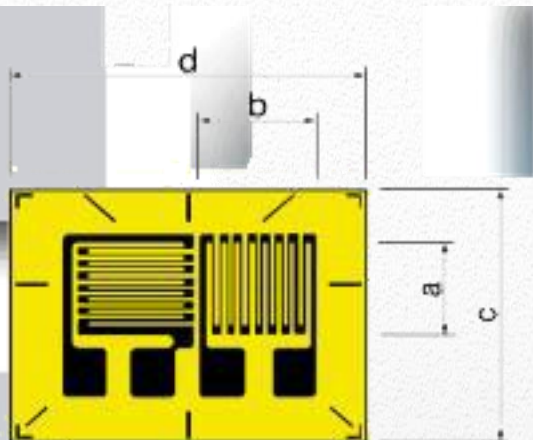
Single Linear type 120Ω strain gauge Model No. for Steel or Concrete			DIMENSION (unit : mm)			
No lead wire type	Lead wire(10mm) type	Cable(1meter) type	a	b	c	d
AP-11-S10S-120-E	AP-11-S10S-120-EL	AP-11-S10S-120-EC	1	1.2	5	3.2
AP-11-S15S-120-E	AP-11-S15S-120-EL	AP-11-S15S-120-EC	1.5	1.5	7	4
AP-11-S30N-120-E	AP-11-S30N-120-EL	AP-11-S30N-120-EC	3	1.7	9	5
AP-11-S50N-120-E	AP-11-S50N-120-EL	AP-11-S50N-120-EC	5	2.1	11	5
AP-11-S80N-120-E	AP-11-S80N-120-EL	AP-11-S80N-120-EC	8	2.5	15	6
AP-11-S300N-120-E	AP-11-S300N-120-EL	AP-11-S300N-120-EC	30	0.6	40	6
AP-11-S600N-120-E	AP-11-S600N-120-EL	AP-11-S600N-120-EC	60	0.8	70	6
AP-11-S900N-120-E	AP-11-S900N-120-EL	AP-11-S900N-120-EC	90	0.9	100	6
Single Linear type 120Ω strain gauge Model No. for Aluminum			DIMENSION (unit : mm)			
AP-23-S10S-120-E	AP-23-S10S-120-EL	AP-23-S10S-120-EC	1	1.2	5	3.2
AP-23-S15S-120-E	AP-23-S15S-120-EL	AP-23-S15S-120-EC	1.5	1.5	7	4
AP-23-S30N-120-E	AP-23-S30N-120-EL	AP-23-S30N-120-EC	3	1.7	9	5
AP-23-S50N-120-E	AP-23-S50N-120-EL	AP-23-S50N-120-EC	5	2.1	11	5
AP-23-S80N-120-E	AP-23-S80N-120-EL	AP-23-S80N-120-EC	8	2.5	15	6
AP-23-S300N-120-E	AP-23-S300N-120-EL	AP-23-S300N-120-EC	30	0.6	40	6
AP-23-S600N-120-E	AP-23-S600N-120-EL	AP-23-S600N-120-EC	60	0.8	70	6
AP-23-S900N-120-E	AP-23-S900N-120-EL	AP-23-S900N-120-EC	90	0.9	100	6



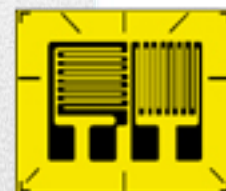
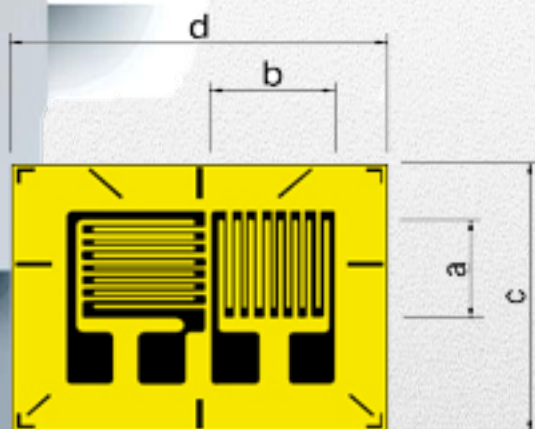
- * General shear type strain gauge
(Q series : Single shear)
- * Shear & torque application
- * Grid size : 1 - 10mm
- * Resistance : 120Ω
- * Similar geometry pattern available
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.



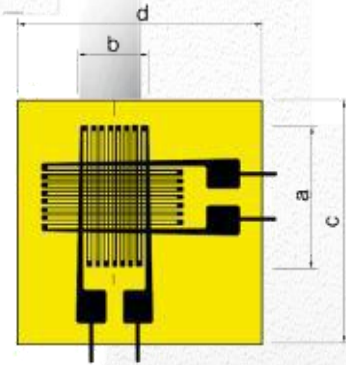
Single Shear type 120Ω strain gauge Model No. for Steel or Concrete			DIMENSION (unit : mm)				
No lead wire type	Lead wire(10mm) type	Cable(1meter) type	a	b	c	d	e
AP-11-Q15N-120-E	AP-11-Q15N-120-EL	AP-11-Q15N-120-EC	3.6	1.4	8	4	1.5
AP-11-Q30N-120-E	AP-11-Q30N-120-EL	AP-11-Q30N-120-EC	5.1	2.6	10	5.6	3
Single Shear type 120Ω strain gauge Model No. for Aluminum			DIMENSION (unit : mm)				
AP-23-Q15N-120-E	AP-23-Q15N-120-EL	AP-23-Q15N-120-EC	3.6	1.4	8	4	1.5
AP-23-Q30N-120-E	AP-23-Q30N-120-EL	AP-23-Q30N-120-EC	5.1	2.6	10	5.6	3



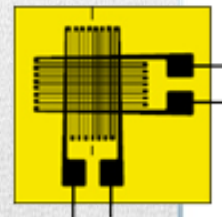
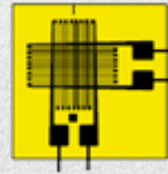
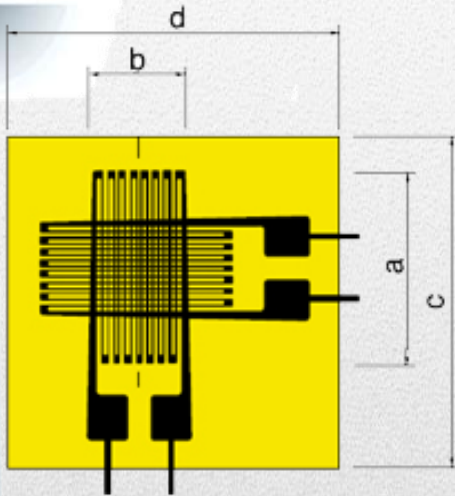
- * Tee Rosette type strain gauge (T series : 2-90°)
- * Shear, torque and point stress analysis application
- * Resistance : 120Ω
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.



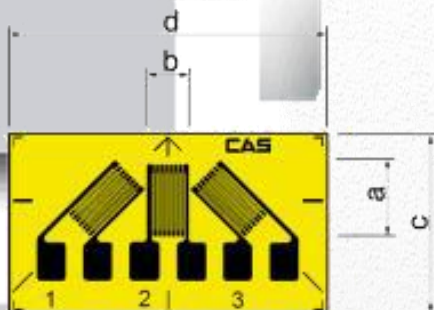
Tee Rosette type 120Ω strain gauge Model No. for Steel or Concrete			DIMENSION (unit : mm)			
No lead wire type	Lead wire(10mm) type	Cable(1meter) type	a	b	c	d
AP-11-T10S-120-E	AP-11-T10S-120-EL	AP-11-T10S-120-EC	1	1.2	5.3	6
AP-11-T15S-120-E	AP-11-T15S-120-EL	AP-11-T15S-120-EC	1.5	1.5	6.5	7
AP-11-T30S-120-E	AP-11-T30S-120-EL	AP-11-T30S-120-EC	3	3	9	11
Tee Rosette type 120Ω strain gauge Model No. for Aluminum			DIMENSION (unit : mm)			
AP-23-T10S-120-E	AP-23-T10S-120-EL	AP-23-T10S-120-EC	1	1.2	5.3	6
AP-23-T15S-120-E	AP-23-T15S-120-EL	AP-23-T15S-120-EC	1.5	1.5	6.5	7
AP-23-T30S-120-E	AP-23-T30S-120-EL	AP-23-T30S-120-EC	3	3	9	11



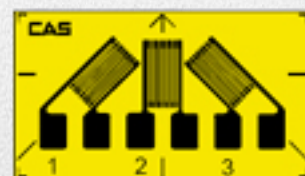
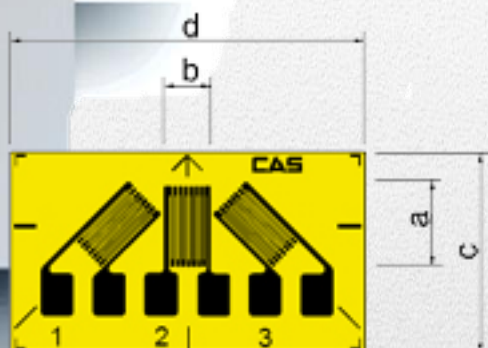
- * Tee Rosette type strain gauge (TS series : 2-90°)
- * Shear, torque and point stress analysis application
- * Resistance : 120Ω
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.



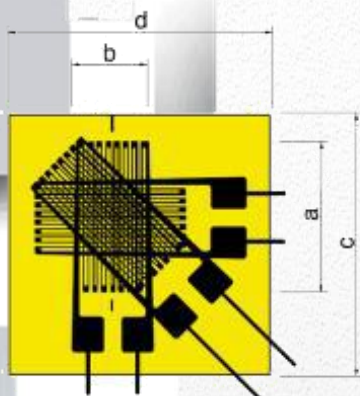
Tee Rosette type 120Ω strain gauge Model No. for Steel or Concrete			DIMENSION (unit : mm)			
No lead wire type	Lead wire(10mm) type	Cable(1meter) type	a	b	c	d
AP-11-TS10S-120-E	AP-11-TS10S-120-EL	AP-11-TS10S-120-EC	1	1.2	5	5
AP-11-TS30N-120-E	AP-11-TS30N-120-EL	AP-11-TS30N-120-EC	3	1.7	9	9
AP-11-TS50N-120-E	AP-11-TS50N-120-EL	AP-11-TS50N-120-EC	5	2.1	11	11
Tee Rosette type 120Ω strain gauge Model No. for Aluminum			DIMENSION (unit : mm)			
AP-23-TS10S-120-E	AP-23-TS10S-120-EL	AP-23-TS10S-120-EC	1	1.2	5	5
AP-23-TS30N-120-E	AP-23-TS30N-120-EL	AP-23-TS30N-120-EC	3	1.7	9	9
AP-23-TS50N-120-E	AP-23-TS50N-120-EL	AP-23-TS50N-120-EC	5	2.1	11	11



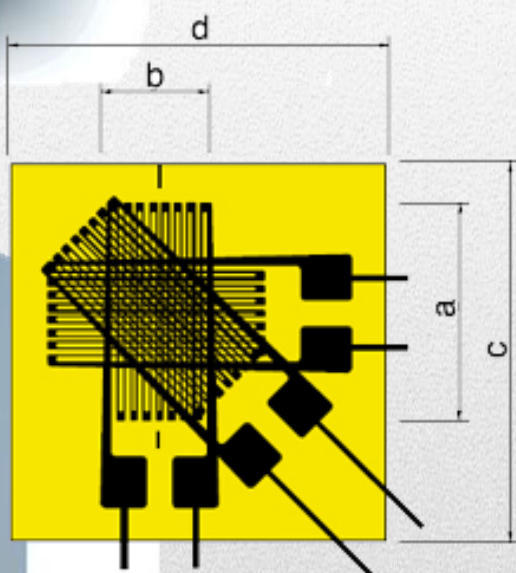
- * Tee Rosette type strain gauge (R series : 3- element)
- * Shear, torque and point stress analysis application
- * Resistance : 120Ω
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.



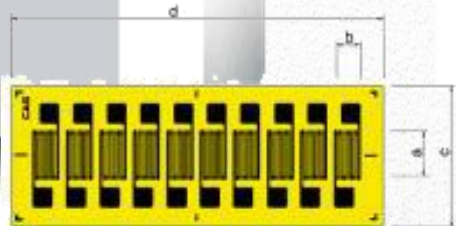
3-Element Rosette type 120Ω strain gauge Model No. for Steel or Concrete			DIMENSION (unit : mm)			
No lead wire type	Lead wire(10mm) type	Cable(1meter) type	a	b	c	d
AP-11-R10S-120-E	AP-11-R10S-120-EL	AP-11-R10S-120-EC	1	1.2	6	9
AP-11-R15S-120-E	AP-11-R15S-120-EL	AP-11-R15S-120-EC	1.5	1.5	7	12
AP-11-R30N-120-E	AP-11-R30N-120-EL	AP-11-R30N-120-EC	3	1.3	9	15
3-Element Rosette type 120Ω strain gauge Model No. for Aluminum			DIMENSION (unit : mm)			
AP-23-R10S-120-E	AP-23-R10S-120-EL	AP-23-R10S-120-EC	1	1.2	6	9
AP-23-R15S-120-E	AP-23-R15S-120-EL	AP-23-R15S-120-EC	1.5	1.5	7	12
AP-23-R30N-120-E	AP-23-R30N-120-EL	AP-23-R30N-120-EC	3	1.3	9	15



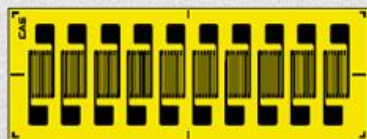
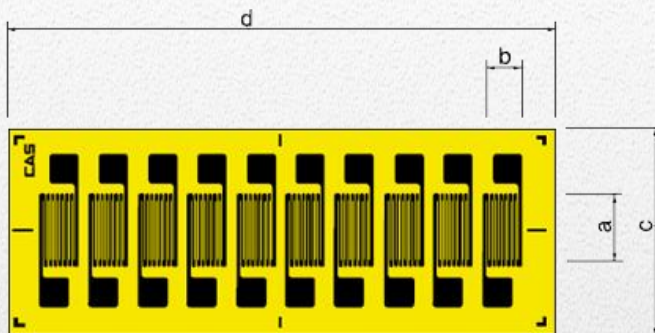
- * Tee Rosette type strain gauge
(RS series : 3- element stacked)
- * Shear, torque and point stress analysis application
- * Resistance : 120Ω
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.



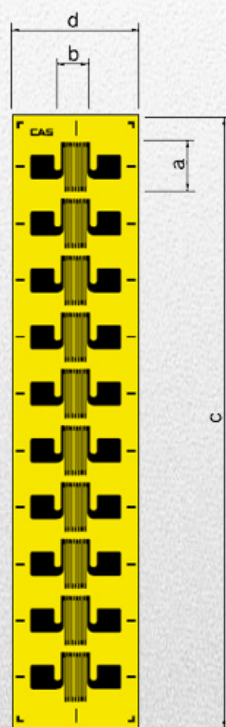
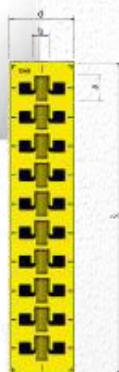
3-Element Rosette type 120Ω strain gauge Model No. for Steel or Concrete			DIMENSION (unit : mm)			
No lead wire type	Lead wire(10mm) type	Cable(1meter) type	a	b	c	d
AP-11-RS30N-120-E	AP-11-RS30N-120-EL	AP-11-RS30N-120-EC	3	1.7	9	9
AP-11-RS50N-120-E	AP-11-RS50N-120-EL	AP-11-RS50N-120-EC	5	2.1	11	11
3-Element Rosette type 120Ω strain gauge Model No. for Aluminum			DIMENSION (unit : mm)			
AP-23-RS30N-120-E	AP-23-RS30N-120-EL	AP-23-RS30N-120-EC	3	1.7	9	9
AP-23-RS50N-120-E	AP-23-RS50N-120-EL	AP-23-RS50N-120-EC	5	2.1	11	11



- * Strip Gauge type strain gauge (SH series)
- * Bending application
- * Resistance : 120Ω
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.

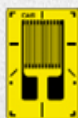
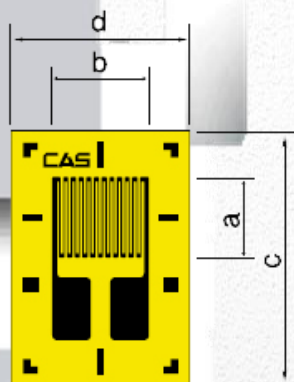


Strip gauge type 120Ω strain gauge Model No. for Steel or Concrete			DIMENSION (unit : mm)			
No lead wire type	Lead wire(10mm) type	Cable(1meter) type	a	b	c	d
AP-11-SH15S-120-E	AP-11-SH15S-120-EL	AP-11-SH15S-120-EC	1.5	1.5	7.5	22
AP-11-SH30N-120-E	AP-11-SH30N-120-EL	AP-11-SH30N-120-EC	3	1.5	9.7	27
Strip gauge type 120Ω strain gauge Model No. for Aluminum			DIMENSION (unit : mm)			
AP-23-SH15S-120-E	AP-23-SH15S-120-EL	AP-23-SH15S-120-EC	1.5	1.5	7.5	22
AP-23-SH30N-120-E	AP-23-SH30N-120-EL	AP-23-SH30N-120-EC	3	1.5	9.7	27



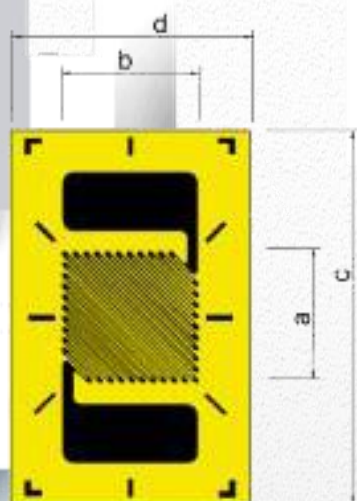
- * Strip Gauge type strain gauge (SV series)
- * Bending application
- * Resistance : 120Ω
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.

Strip gauge type 120Ω strain gauge Model No. for Steel or Concrete			DIMENSION (unit : mm)			
No lead wire type	Lead wire(10mm) type	Cable(1meter) type	a	b	c	d
AP-11-SV15S-120-E	AP-11-SV15S-120-EL	AP-11-SV15S-120-EC	1.5	1.5	27	8
AP-11-SV30N-120-E	AP-11-SV30N-120-EL	AP-11-SV30N-120-EC	3	1.6	44.5	8.8
Strip gauge type 120Ω strain gauge Model No. for Aluminum			DIMENSION (unit : mm)			
AP-23-SV15S-120-E	AP-23-SV15S-120-EL	AP-23-SV15S-120-EC	1.5	1.5	27	8
AP-23-SV30N-120-E	AP-23-SV30N-120-EL	AP-23-SV30N-120-EC	3	1.6	44.5	8.8

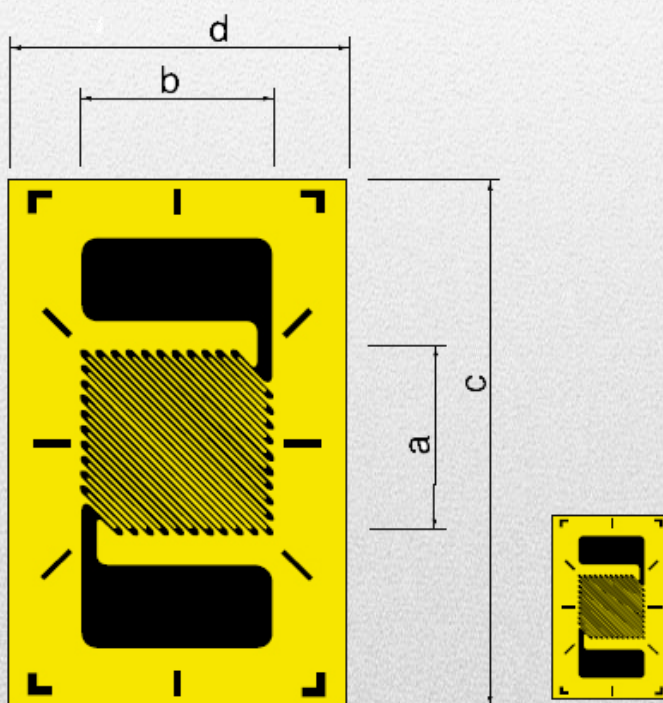


- * Widely used general purpose linear type strain gauge (S series strain gauge)
- * Bending application
- * Grid size : 1 - 90mm
- * Resistance : 350Ω
- * Similar geometry pattern available
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.

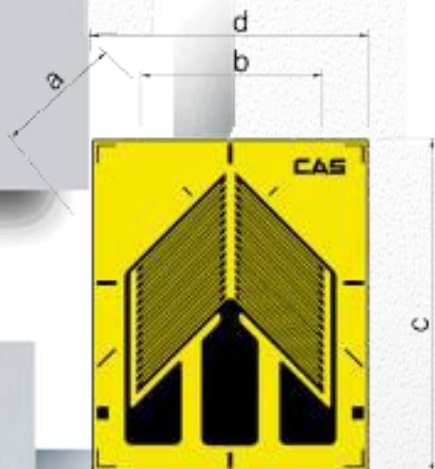
Single Linear type 350Ω strain gauge Model No. for Steel or Concrete			DIMENSION (unit : mm)			
No lead wire type	Lead wire(10mm) type	Cable(1meter) type	a	b	c	d
AP-11-S15S-350-E	AP-11-S15S-350-EL	AP-11-S15S-350-EC	1.5	1.7	4.8	3.2
AP-11-S15W-350-E	AP-11-S15W-350-EL	AP-11-S15W-350-EC	1.5	3.5	5	5
AP-11-S20W-350-E	AP-11-S20W-350-EL	AP-11-S20W-350-EC	2	2.6	6	4
AP-11-S20N-350-E	AP-11-S20N-350-EL	AP-11-S20N-350-EC	3	1.3	5.4	2.9
AP-11-S30N-350-E	AP-11-S30N-350-EL	AP-11-S30N-350-EC	3	1.3	6.5	2.5
AP-11-S30S-350-E	AP-11-S30S-350-EL	AP-11-S30S-350-EC	3	3	7.9	4.9
Single Linear type 350Ω strain gauge Model No. for Aluminum			DIMENSION (unit : mm)			
AP-23-S15S-350-E	AP-23-S15S-350-EL	AP-23-S15S-350-EC	1.5	1.7	4.8	3.2
AP-23-S15W-350-E	AP-23-S15W-350-EL	AP-23-S15W-350-EC	1.5	3.5	5	5
AP-23-S20W-350-E	AP-23-S20W-350-EL	AP-23-S20W-350-EC	2	2.6	6	4
AP-23-S20N-350-E	AP-23-S20N-350-EL	AP-23-S20N-350-EC	3	1.3	5.4	2.9
AP-23-S30N-350-E	AP-23-S30N-350-EL	AP-23-S30N-350-EC	3	1.3	6.5	2.5
AP-23-S30S-350-E	AP-23-S30S-350-EL	AP-23-S30S-350-EC	3	3	7.9	4.9



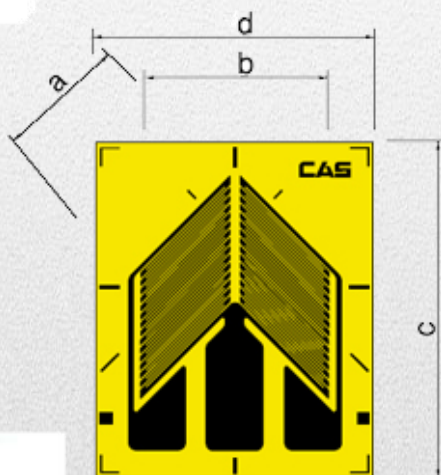
- * General shear type strain gauge
(Q series : Single shear)
- * Shear & torque application
- * Grid size : 1 - 10mm
- * Resistance : 350Ω
- * Similar geometry pattern available
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.



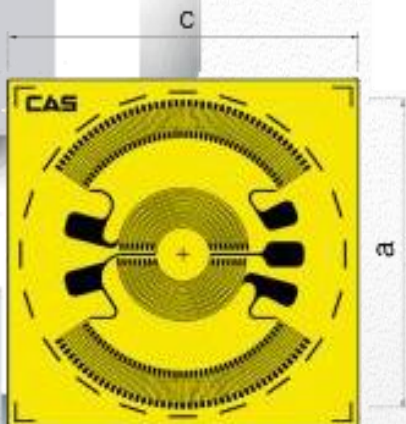
Single shear type 350Ω strain gauge Model No. for Steel or Concrete			DIMENSION (unit : mm)			
No lead wire type	Lead wire(10mm) type	Cable(1meter) type	a	b	c	d
AP-11-Q30S-350-E	AP-11-Q30S-350-EL	AP-11-Q30S-350-EC	3.1	3.1	8.5	5
Single shear type 350Ω strain gauge Model No. for Aluminum			DIMENSION (unit : mm)			
AP-23-Q30S-350-E	AP-11-Q30S-350-EL	AP-11-Q30S-350-EC	3.1	3.1	8.5	5



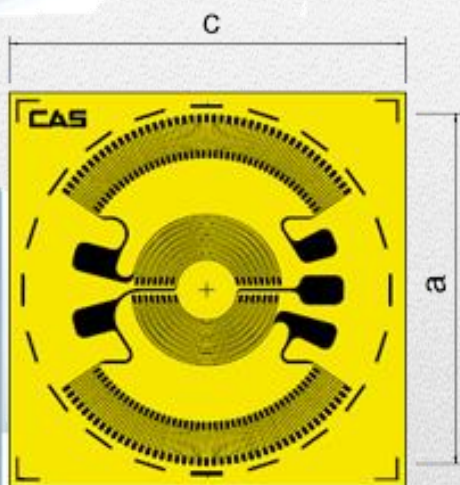
- * Double shear type strain gauge (T series)
- * Shear, torque application
- * Grid size : 1 - 10mm
- * Resistance : 350Ω
- * Similar geometry pattern available
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.



Double shear type 350Ω strain gauge Model No. for Steel or Concrete			DIMENSION (unit : mm)			
Model	Model	Model	a	b	c	d
AP-11-T15N-350-E	AP-11-T15N-350-EL	AP-11-T15N-350-EC	1.5	3	6.5	5
AP-11-T20N-350-E	AP-11-T20N-350-EL	AP-11-T20N-350-EC	2	3.5	7	6
AP-11-T25N-350-E	AP-11-T25N-350-EL	AP-11-T25N-350-EC	2.5	4.1	7.5	6.4
AP-11-T30N-350-E	AP-11-T30N-350-EL	AP-11-T30N-350-EC	3	4.8	8.5	7
Double shear type 350Ω strain gauge Model No. for Aluminum			DIMENSION (unit : mm)			
AP-23-T15N-350(3 tab)	AP-23-T15N-350(3 tab)	AP-23-T15N-350(3 tab)	1.5	3	6.5	5
AP-23-T20N-350-E	AP-23-T20N-350-EL	AP-23-T20N-350-EC	2	3.5	7	6
AP-23-T25N-350-E	AP-23-T25N-350-EL	AP-23-T25N-350-EC	2.5	4.1	7.5	6.4
AP-23-T30N-350-E	AP-23-T30N-350-EL	AP-23-T30N-350-EC	3	4.8	8.5	7

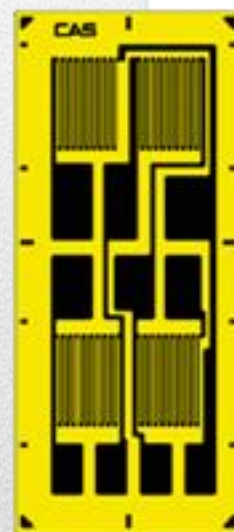
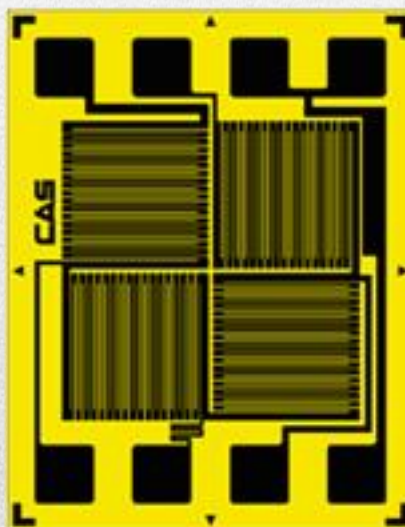
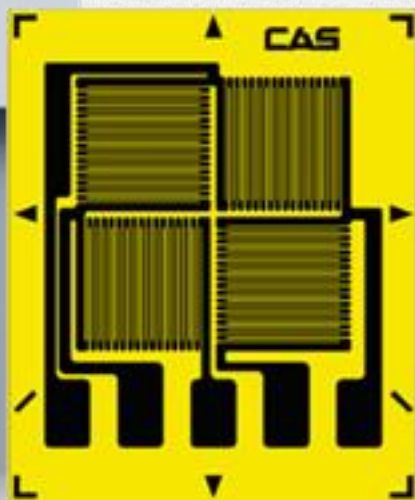


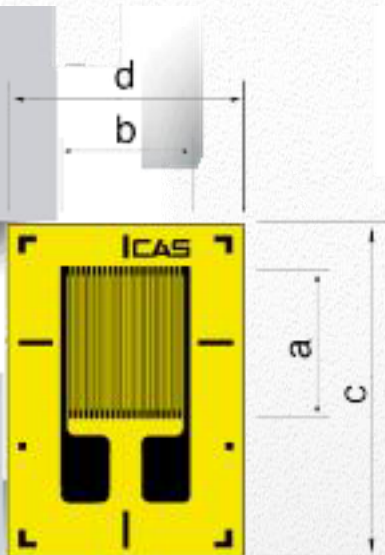
- * Diaphragm type strain gauge (D series)
- * Pressure sensor special application
- * Resistance : 350Ω
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.



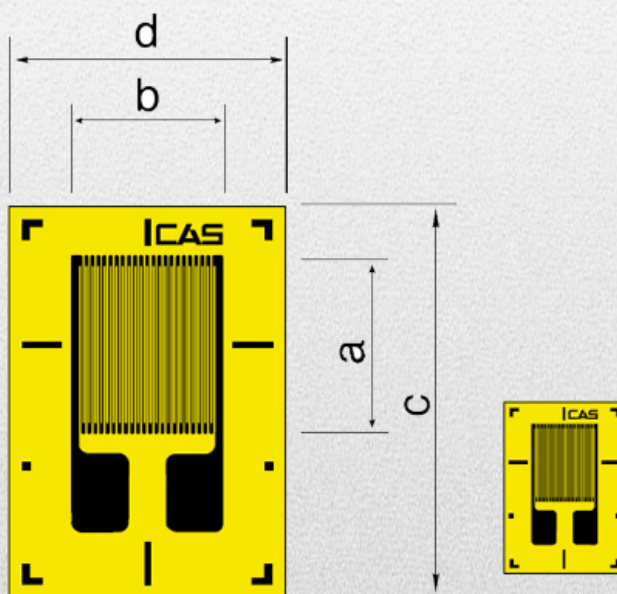
Diaphragm shear type 350Ω strain gauge Model No. for Steel or Concrete			DIMENSION (unit : mm)	
Model	Model	Model	a	b
AP-11-D100-350-E	AP-11-D100-350-EL	AP-11-D100-350-EC	10	10
AP-11-D130-350-E	AP-11-D130-350-EL	AP-11-D130-350-EC	13	13
AP-11-D170-350-E	AP-11-D170-350-EL	AP-11-D170-350-EC	17	17
Diaphragm shear type 350Ω strain gauge Model No. for Aluminum			DIMENSION (unit : mm)	
AP-23-D100-350-E	AP-23-D100-350-EL	AP-23-D100-350-EC	10	10
AP-23-D130-350-E	AP-23-D130-350-EL	AP-23-D130-350-EC	13	13
AP-23-D170-350-E	AP-23-D170-350-EL	AP-23-D170-350-EC	17	17

- * Full-Bridge type strain gauge (FB series)
- * Special order
- * Resistance : 350Ω
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.

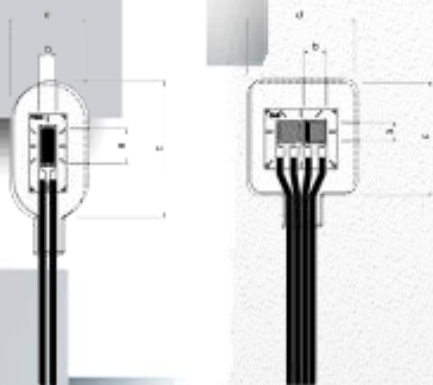




- * Linear type strain gauge (S series)
- * Resistance : 1,000 Ω
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.



Linear shear type 1K Ω strain gauge Model No. for Steel or Concrete			DIMENSION (unit : mm)			
Model	Model	Model	a	b	c	d
AP-11-S30S-1K-E	AP-11-S30S-1K-EL	AP-11-S30S-1K-EC	3	2.7	7	4.8
AP-11-S40S-1K-E	AP-11-S40S-1K-EL	AP-11-S40S-1K-EC	4	3.8	8	5.5
Linear shear type 1K Ω strain gauge Model No. for Aluminum			DIMENSION (unit : mm)			
AP-23-S30S-1K-E	AP-23-S30S-1K-EL	AP-23-S30S-1K-EC	3	2.7	7	4.8
AP-23-S40S-1K-E	AP-23-S40S-1K-EL	AP-23-S40S-1K-EC	4	3.8	8	5.5



- * Linear type or Double shear strain gauge (S or T series)
- * Resistance : 120Ω
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.

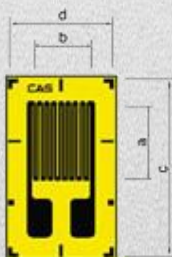
Steel or Concrete	DIMENSION (unit : mm)			
Model	a	b	c	d
AP-11-S50N-W	3	2.7	7	4.8
AP-11-S30S-W	4	3.8	8	5.5
Aluminum	DIMENSION(unit : mm)			
AP-23-S30S-2K-E	3	2.7	7	4.8
AP-23-S40S-2K-E	4	3.8	8	5.5

High Temperature type Strain Gauge

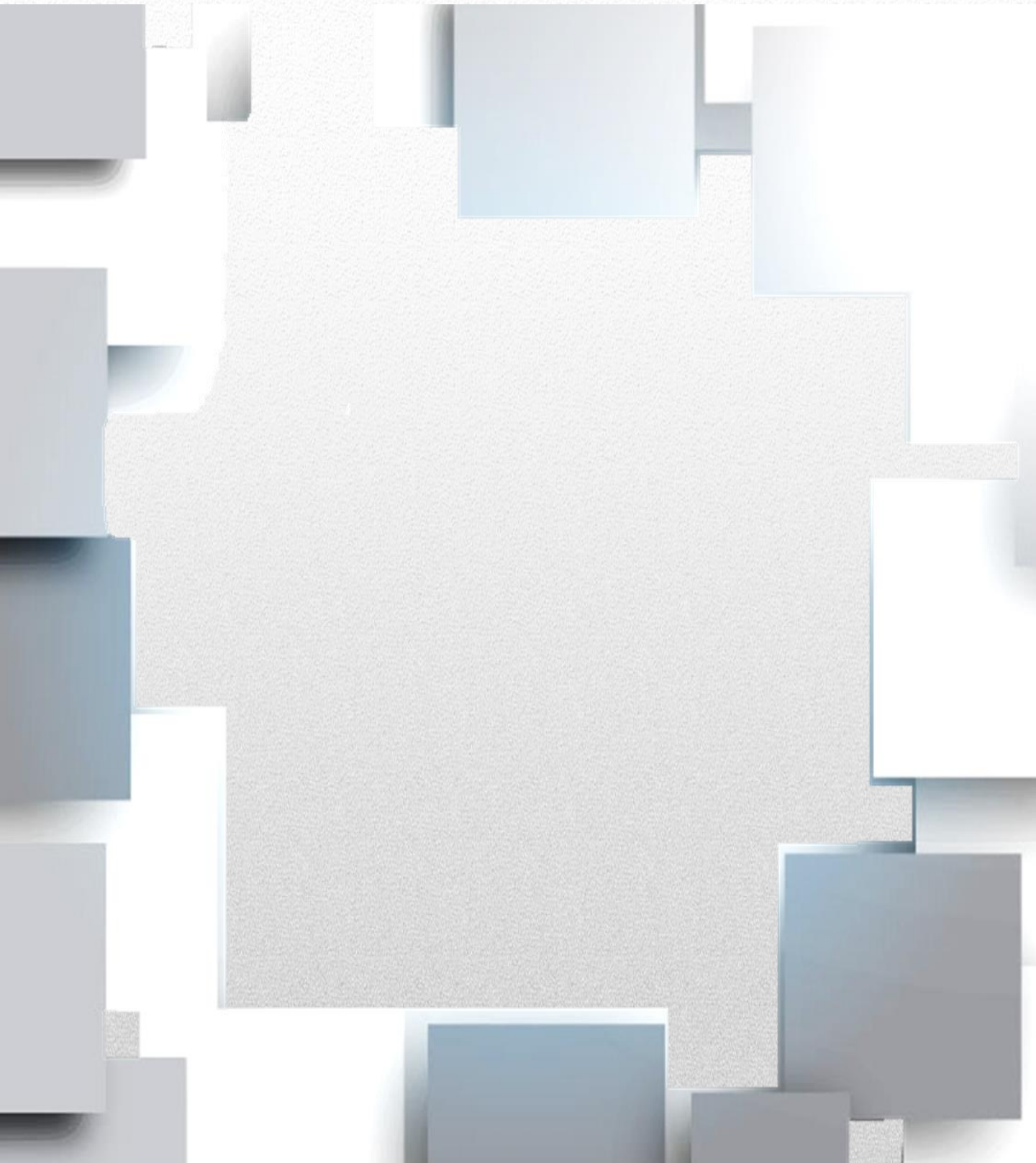
High Temperature K-Series Strain Gage (Only Steel)

- * High Temperature type strain gauge
- * Steel only
- * Resistance : 350Ω or 1KΩ
- * Cas strain gauge has been manufactured based on international standard of NAS942. OIML and ASTM.

A P - 23 - S 30 S
350 - 50 - E L



Model No.	DIMENSION (unit : mm)			
	a	b	c	d
KP-11-S30S-350	3	2.4	7.5	4.4
KP-11-S40S-1K	3	2.7	7.5	4.9





JooShin Corporation

Company Address

Rm.#707, A-Sung Plaza,
Hwajoongro 130 bungil 14,
Dukyang-gu, Goyang-city,
Kyeonggi-do, Korea

Tel : 82-70-8723-2200

Fax : 82-303-3130-7533

E-mail : sales@jooshin.kr

