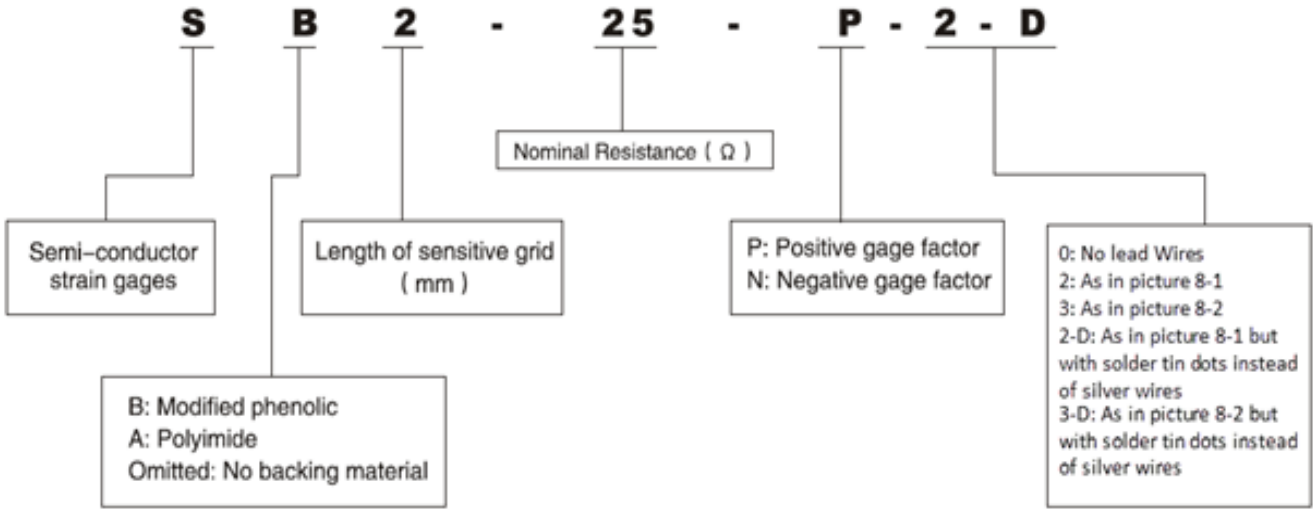
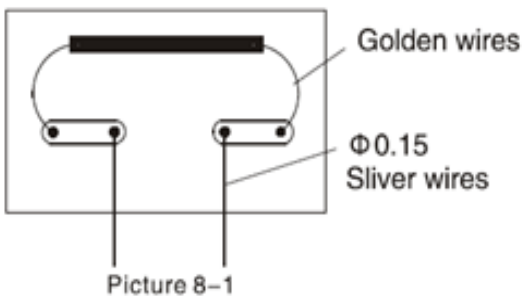
Semi-conductor strain gauges

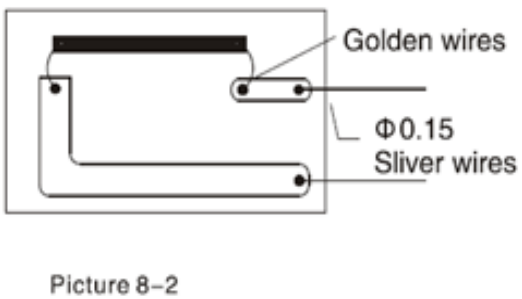
Semi–conductor strain gauges are primarily produced from Silicon, Germanium, Antimony steel, Gallium Phosphide and other materials with a large sensitivity factor and therefore have a far larger signal output that ordinary strain gauges. It has a small transverse effect factor, small mechanical hysteresis, small size and are easy to use with the manufacturing of large and small transducers.

Semi-conductor designation





Picture 8–1



Picture 8–2

Linear compensation principle of semi-conductor strain gauges

Due to unbalance caused by transverse (Poisson Strain) and axial strain in a column or similar structure transducers elements, a non–linearity error arises in the bridge output. On top of that the non–linearity between load and strain, material non–linearity and transverse load non–linearity will cause a severe accuracy error of column or similar structure transducers. Therefore a correction has to be made to meet the high accuracy required for production of high precision transducers.

Semi-conductor stain gauge

Non–linear compensation is done by changing the actual supply voltage of the bridge to compensate the transducers linear accuracy. The amount of voltage has to increase when load on the transducer is increased. Generally 2 semi–conductors are bonded symmetrically and opposite of each other in the direction of the applied load and in the strain area of the transducer. This is displayed in Figure 6 where the semi–conductor is displayed as RL. The semi–conductors will decrease in resistance when load is applied and this will result in a higher voltage being applied to the bridge. The way to assemble these into the electrical circuit is as follows: Connect two semi–conductors with the (required value of the semi conductor)/2 into the electric circuit in both the Input + and Input – branches. These are the last resistors the input voltage goes through before entering the bridge. This is displayed in Figure 7.

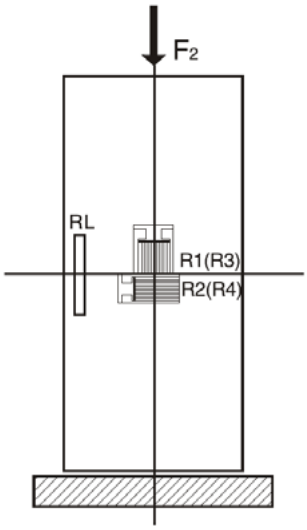


Figure 6: Semi–conductor bonding location

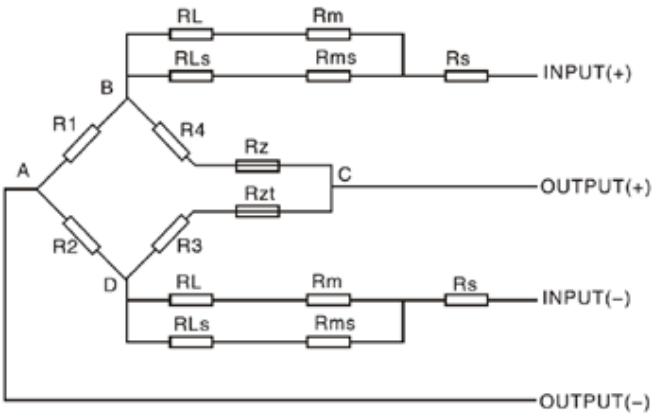


Figure 7: Linear compensations location in a full bridge sketch

Semi-conductor stain gauge

A non–linearity error in a column or similar structure transducer has a curve in the form of a digressive parabola. This means that when the load is increased the output will change less and less. Due to the input voltage of the bridge increasing the change of output will be increased again and by compensating this the real output of the transducer will be a straight line again.

Model	Backing dimensions (mm)	Grid dimensions (mm)	Nominal resistance (Ω)	Sensitivity coefficient K	Resistance temperature coefficient (1/°C)	Sensitivity temperature coefficient (1/°C)	Maximum working temperature (°C)	Maximum working current (mA)	Maximum strain (με)
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