

Span Unification

The span is the net output signal of sensors, which is proportional to the net load imposed on to the sensor. If only one sensor is used to set up a measuring system, it is not necessary to unify its span. Nevertheless, when more than one sensors are employed together to set up one measuring system, the spans of those sensors have to be unified to a nominal value with allowed tolerance. Otherwise the spans of those sensors are hard to be trimmed by the electronics of the measuring system.

To unify the span of sensors in mass production, the so-called span unification (SU) resistors are applied. The [OCF-series bondable SU resistors](#) from BCM SENSOR are designed for this purpose. Shown in Fig. 1 is an example using two OCF-2/22D-CS SU bondable resistors to unify the span.

The 100 circles as shown in Fig. 2, represent the spans of the 100 spans before the unification, while the dots represent the unified spans within the tolerance of $\pm 1\%fs$, after the two bondable SU resistors, OCF-2/22D-CS, are used to trim the effective excitation voltage of sensors.

The total resistance of the SU resistor(s) can be calculated approximately according to the formula:

$$R_s \approx (S_1 - S_2) / S_2 \cdot R_{IN}$$

Where,

- R_s = the total resistance of SU resistor(s);
- S_1 = the output sensitivity of sensor before connecting the SU resistor;
- S_2 = the designed output sensitivity of sensor after connecting the SU resistor;
- R_{IN} = the input resistance of bridge circuit.

It is recommended to form a symmetric circuit, so one can make use of two SU resistors of $R_s/2$ resistance. For instance, if $R_s = 30\Omega$, one can make use of two OCF-2/22D-CS SU resistors with its resistance adjustable around 15Ω for batch sensor production, as shown by Fig. 1.

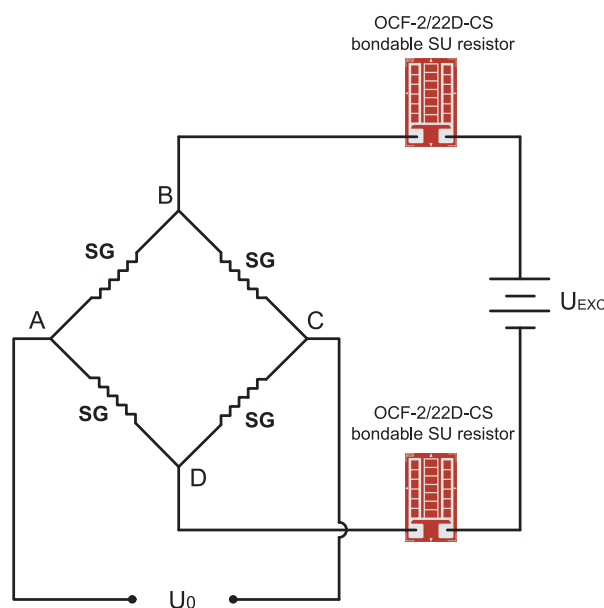


Fig. 1: Sketch of Circuit Using OCF-2/22D-CS to Unify Span

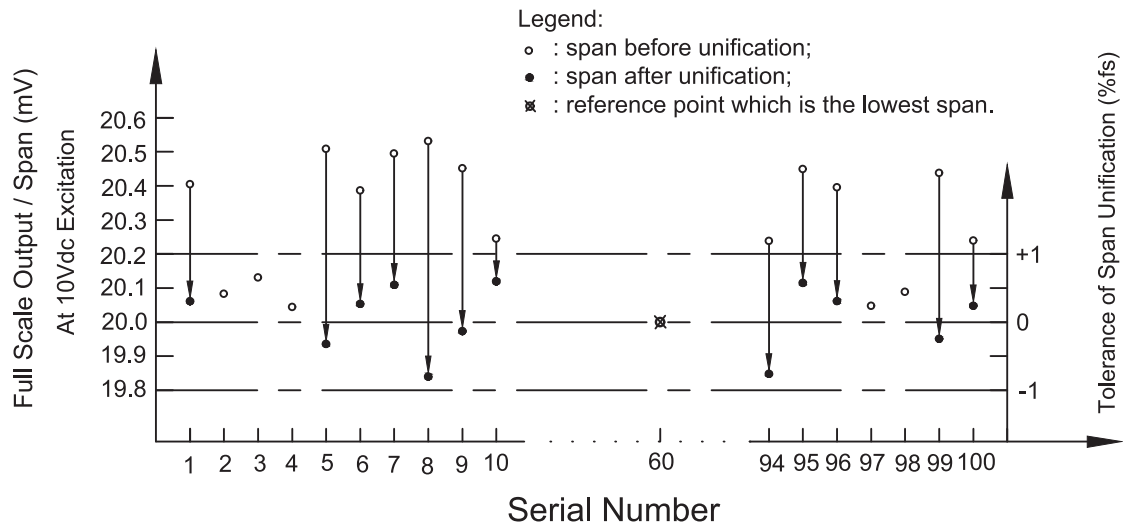


Fig. 2: Diagram Showing Span Unification of 100 Sensors

According to the working principle of the SU- and SC-resistor, it is possible to use the SC resistor(s) to realize both span unification and span-temperature-compensation.