Application Note

Temperature Compensation Resistor Selection Procedure

MUPI-3, SSY0079 and SA40012 Signal Conditioners

This Application Note provides procedural guidelines for selecting a proper value ëtemperature compensation resistorí, for the MUPI-3, SSY0079 and SA40012 Signal Conditioners. This resistor is employed to reduce the level of ëscale temperature coefficientí effects. It is important to note that it will have no influence on the ënull (zero) temperature coefficientí, which is generally minimal.

The ëtemperature compensation resistorí, identified as either **RT, R1** or **R3**, is used in conjunction with a #KTY81-120 ësilicon temperature sensorí. Each signal conditioner has a position and/or connection point for both items. Please see the specific Product Data Sheet for the Signal Conditioner you are using.

It is important to note that this procedure is strictly a *guideline*. Due to the various nuances of each sensor type, and their associated relationship between the signal conditioner and compensation components, no firm rule can be applied to determine the exact value. Therefore, some experimentation will be required to optimize results.

<u>Procedure</u>

Note: This procedure assumes that the test equipment used is of adequate accuracy and repeatability. Assure prior to proceeding that all test equipment specifications are acceptable!

1. If the #KTY81-120 ësilicon temperature sensorí has not already been connected to the signal conditioner, do so a this time.

2. Connect a decade resistance box across the **RT, R1** or **R3** position (model dependent) of the signal conditione

3. Obtain the nominal starting for value for **RT, R1** or **R3** from the chart below, and adjust decade resistance box t that value. Note that the SH50058-A-003 requires no resistor to be installed. All values are in ohms.

	Signal Conditioner Model		
Sensor Type	MUPI-3	SSY0079	SA40111
RG-33A	70K	140K	140K
RG-33T	70K	140K	140K
RG-33N	70K	140K	140K
RG-57S	70K	65K	65K
CG-10N	10K	65K	65K
CG-50S	10K	65K	65K
CG-57S	10K	65K	65K
L-210	30k	100K	100K
L-211U	20K	75K	75K
L-212T	20k	75K	75K

	Signal Conditioner Model		
Sensor Type	MUPI-3	SSY0079	SA40111
SH50054-A-003	70k	140K	140K
SH50055-A-009	70k	140K	140K
SH50056-A-003	10K	75k	75k
SH50056-A-008	10K	75K	75K
SH50058-A-001	100K	100K	100K
SH50058-A-003	open	open	open

4. Apply power to the signal conditioner, and let output stabiliz

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5. Check the output of the signal conditioner at null (zero) and at full scale by tilting the sensor through its full angular range. Adjust null and scale if necessary to achieve desired values. See the Product Data Sheet for the Signal Conditioner you are using for details on adjustments.

6. Record output readings at null and full scale, and ambient (room) temperature in ^{o}C (degrees Celsius).

7. Reduce temperature chamber setting to lowest operating temperature desired (within specification limits), and le soak for one hour.

8. Record output readings at null and full scale, and actual test temperatur

9. Increase temperature chamber setting to highest operating temperature desired (within specification limits), an let soak for one hour.

10. Record output readings at null and full scale, and actual test temperature. Return temperature chamber to room temperature.

11. Calculate the scale factor for the three temperature readings recorded, by subtracting the null reading from the full scale reading at each temperature.

12. Compare the ëhighí temperature scale factor to the ëlowí temperature scale factor. If it is of a higher value, then the temperature coefficient is considered to be ëpositiveí. If it is lower, it is ënegativeí.

NOTE: Only coefficients of a ënegativeí value can be compensated. If your testing has yielded a ëpositiveí value, please consult factory!

13. Subtract the lower of the two from the higher. Divide this number by the scale factor at ambient (room) temperature, times by 100, and divide by the temperature test range (highest minus lowest temperature). This will give you the ëscale temperature coefficientí in % / ^{o}C . See equation below.

$$\frac{\text{Highest scale factor ñ lowest scale factor}}{} \times 100 \div \text{temp. test range } (^{o}C) = \ldots$$

^{o}C

14. The approximate change to the value of R_T / R_1 is determined as follows. For every -.05%/^{o}C of scale temperature coefficient, increase the value R_T / R_1 by a factor of 4.5X. For example, if the starting value of R_T / R_1 was 10K ohms, and the scale temperature coefficient was -.05%/^{o}C, the new value would be 45K ohms.

15. Adjust decade resistance box to this new value

16. Repeat step #5 through #14 until desired results are obtained.

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