Application Note
MUPI-3 Universal Signal Conditioner
Calibration Procedure

Overview

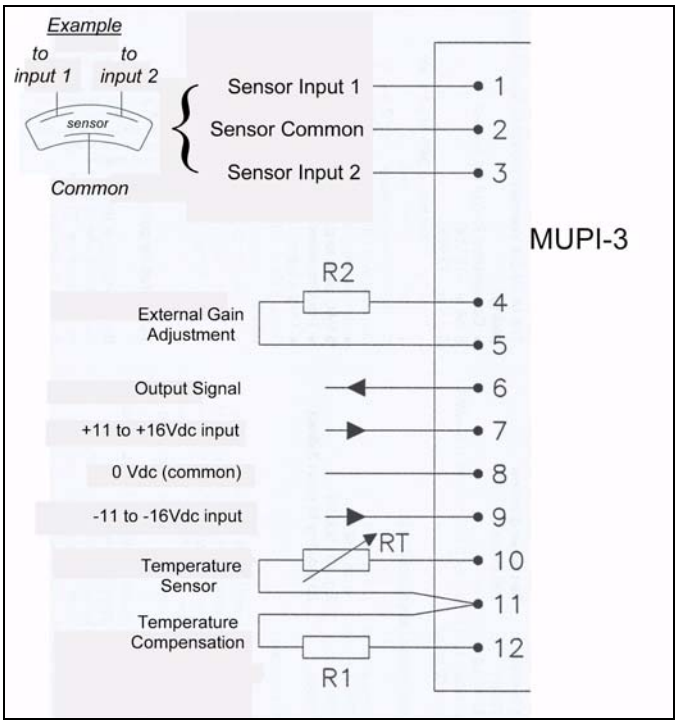
The following procedure details how to calibrate the MUPI-3 Universal Signal Conditioner for proper null (zero) output, and scale factor (gain), for a particular Spectron single axis tilt sensor. *It should be noted that by performing any of these adjustments, all 'factory calibration' settings WILL be voided!*

Equipment Required

- +/-12Vdc Power Supply
- Digital Voltmeter
- Tilt/Rotary Table

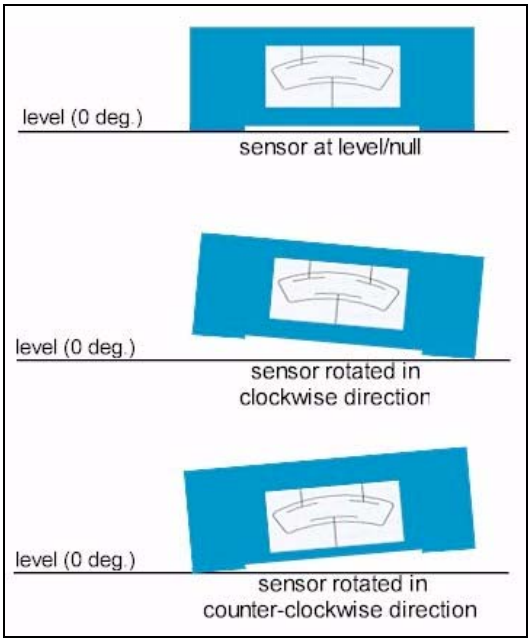
**Note: the angular positional accuracy of the tilt/rotary table utilized should be a factor of 10X greater than the desired resultant calibration accuracy!*

Electrical Connection Diagram



Calibration Procedure

1. Connect the tilt sensor to the MUPI-3 on terminal numbers 1, 2, and 3 per diagram.
2. Connect the Digital Voltmeter to the MUPI-3 on terminal numbers 6 and 8.
3. Connect the DC power supply to the MUPI-3 on terminal numbers 7, 8, and 9.
4. Turn on DC power supply. Adjust to +/-12Vdc if necessary.
5. Place tilt sensor in the level (null) position. Wait at least 20 seconds for sensor to settle. *Note: sensors with higher fluid viscosities (i.e. damped) may require a longer waiting period!*



6. Turn 'Sensor Null Adjustment' potentiometer until output on Digital Voltmeter reads 0.000Vdc (see below for potentiometer locations).

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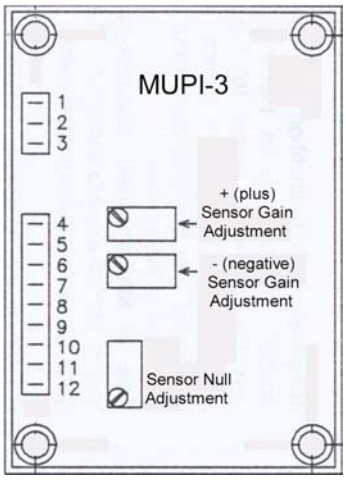

7. Rotate the tilt sensor in a clockwise direction to half of the desired angular measurement range. Wait at least 20 seconds.
8. Turn the '+ (plus) Sensor Gain Adjustment' potentiometer to obtain half the desired output voltage (+3Vdc max.).
9. Rotate tilt sensor in a counter-clockwise direction to half of the desired angular measurement range. Wait at least 20 seconds.
10. Turn the ' - (negative) Sensor Gain Adjustment' potentiometer to obtain half the desired output voltage (-3Vdc max.).
11. Repeat steps 5 through 10, and adjust as necessary. Calibration is considered complete when no further adjustments are required.

External Gain Adjustment

The MUPI-3 is capable of providing a higher than unity (1) output gain, by means of an external gain resister, R2 (see Electrical Connection Diagram). This becomes useful when the total angular measurement range of a particular sensor will not be utilized, yet the maximum +/-6Vdc output is still required.

NOTE: By increasing the gain, electrical 'noise' will also increase, and other performance parameters may be affected. It is suggested that all performance specifications be subsequently verified once the gain has been modified. Regardless, it is not recommended to increase the gain above a factor of X3!

The mathematical equation for determining the gain factor for a particular gain resister value is as follows.

$$\text{Gain} = \frac{100\text{k}}{\text{R2}} + 1$$

The following are resister values for typical gain increases. Once the resister has been selected and installed, repeat the Calibration Procedure.

R2 value*	Gain Factor
100 kohm	X2
50 kohm	X3

* Resister type = metal film, 1%, 1/8 watt

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