Inertial Tech Note:

Inertial Sensor Self-Test Function

Overview

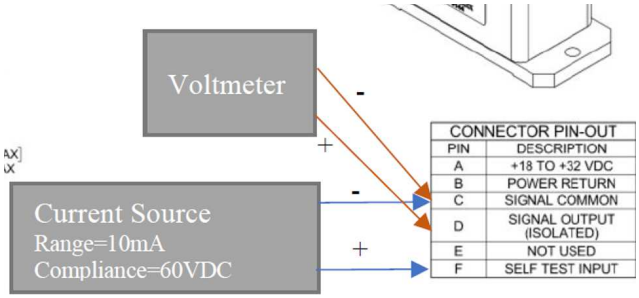
Many of Jewell Instrument's Inertial sensors include a self-test feature, which allows the user to evaluate the state of the units torquer mechanism by simulating an input force as a check on the the full range output of the sensor. The self-test feature can also be used as a check on the user's system if they compare the expected output value from the sensor vs the value they read on their interface.

There are two self-test methods that depend on the sensor design: "grounded torquer self-test" and "grounded load, floating torquer." In both cases, the user will drive a specified amount of current into specific test pins and measure the resulting output signal. The expected output value and required test current is specified in the units ATP report published to the customer along with the purchased sensor:

Electrical

Input Voltage Range, VDC	18 to 32
Input Current, mA, nom	25
Self-Test Input Current, mA	7.0 ± 15%
Self-Test Output, VDC	5.00
Output Impedance, Ohms, nominal	100
Insulation resistance, megohms minimum at 100 VDC	100
Noise, Vrms, maximum	0.005

Grounded Torquer Self-Test Method



- A current source is connected to the specified pins of the sensor. In this case, it is pins C & F of the sensors C-type connector. Pins C & F are the Signal common and Self-Test input respectively.
- A voltmeter is connected to pin C, signal common, and D, signal output.
- Once the current source and the voltmeter are connected and the sensor is powered up, the user can drive current into the self-test input pin. In the ATP example above, this is 7.0mA.
- The output should read as the Full range output, which is typically 5V.
- The test is considered passed if the full range output signal is observed while the input current is driven within the specified test range – in this case, per the ATP report, it is 7.0mA ±15%.
- Grounded torquer self-test applies to newer sensor models that utilize Jewell's J301 torquer module such as the LCF501-R series for example.

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Grounded Load, Floating Torquer

- Some sensor products use a floating torquer, where the output contains a grounded load. In these cases, the user must use a high impedance floating current source to perform the same test.
- For most sensors with a floating torquer, the output during self-test will be the reverse polarity of the driven current when measuring across the grounded load.
- The grounded load, floating torquer self-test can be found LSO & LSRP series among other product types.
- Below are schematic examples of DC self-test, and AC self-test:

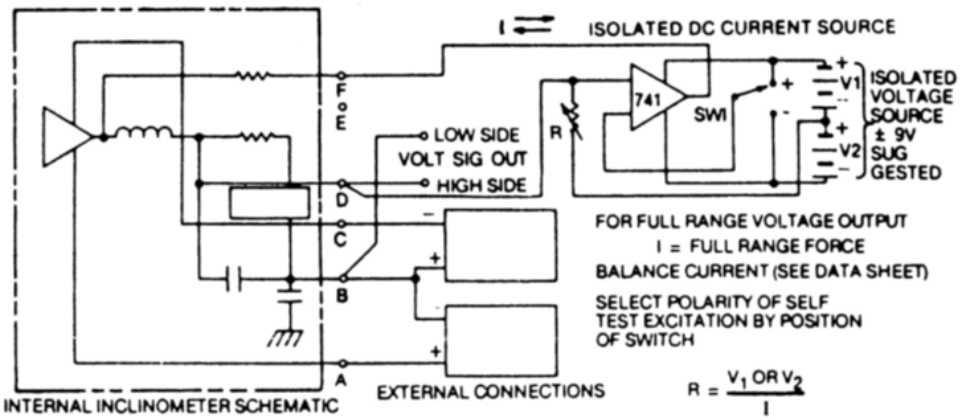

FIGURE 3 DC SELF TEST

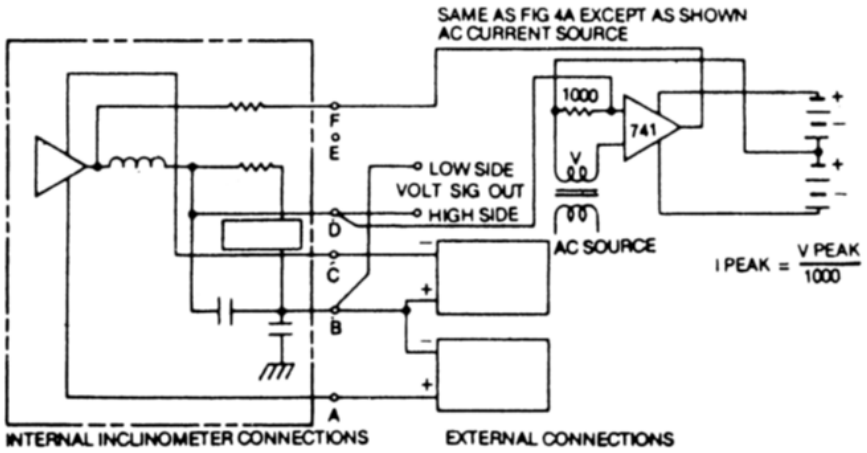

FIGURE 4 AC SELF TEST

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