Reed Switch Testing

HSI SENSING™

HERMETIC SWITCH INC.

Reed Switch Application Notes

APPLICATION NOTES: Reed Switch Testing

Reed switches, invented in the 1930s, required a means to accurately and efficiently measure their magnetic sensitivity. Standard test coils were developed for this purpose. These coils, available in various sizes and matched physically to the variety of reed switch sizes, can be operated rapidly by computer-controlled test systems. For efficient operation the coils have either 5,000 or 10,000 turns, and the coil lengths are designed to deliver an efficient magnetic field shape (typically over the glass length of the reed switch). With computer-controlled precise incremental steps of current flowing in the coil, the switch is tested into specific sensitivity windows of ampere turns (number of turns in coil multiplied by the current flow required to activate the switch).

For some of our world's smallest switches and/or our tiny surface-mount sensors, HSI employs equipment utilizing a Helmholtz coil to generate a uniform magnetic field to surround the component. The computerized test system takes the sensor through a number of functional activation and deactivation cycles depending on the requirements of the application.

Magnetic Sensitivity Testing

In magnetic sensitivity testing HSI Sensing employs all four standard test coils defined in EIA/NARM RS-421A and MIL-S-55433. Standard and specific test coils are used to test the operating characteristics of reed switches.

NOTE: Different coils provide different measured values. The proper coil for each reed switch is listed on HSI Sensing specification sheets.

Important factors to consider in order to obtain accurate, stable and consistent pull-in and drop-out readings are:

- The magnetic sensitivity is stated in Ampere Turns, which is related to that specific test coil. The sensitivity rating reflects the amount of current (Ampere) that is flowing through the coil having a specific number of TURNS, when the switch contacts operate.
- The current in the test coil must be carefully controlled and measured with a calibrated instrument.
- Position of the reed switch inside the coil should be controlled. Changing the position of the switch inside the coil will change the AT measurement of the reed switch.
- External magnetic fields need to be considered. The earth's magnetic field can cause reading errors up to about 1 AT. Magnetic fields can be produced by nearby fans, motors, or moving magnets.
- Ferrous material near a test coil can cause errors by altering the magnetic field. Possible ferrous items
  include screws, brackets, connectors and tabletops.
- Stresses applied on the reed switch glass or leads by test equipment can affect the sensitivity readings of the switch by slightly changing the reed switch contact gap.

HSI SENSING HERMETIC SWITCH INC.

- HSI Sensing tests all of our reed switches at 25°C.
- Reed switches are normally designed to operate in a temperature range of - 40°C to 125 °C. Temperatures above 125 °C can cause an increase in pull-in.
- The reed switch blades form a part of the magnetic circuit. Cutting and or bending the leads can result in changed pull-in and drop-out values.

Voltage Breakdown Testing

HSI Sensing employs various commercially available test equipment for voltage breakdown testing (dielectric strength). For voltage breakdown product capabilities see HSI Sensing specification sheets.

Important factors to consider in order to obtain accurate, stable and consistent voltage hold-off and leakage current measurements are:

- Regulated and precise voltage test equipment capable of measuring current in micro amps. Contact
  HSI Sensing for recommended test equipment options.
- Placing the reed switch in a suitable holding fixture that will not contribute to any leakage current
  and not apply any stress
- Limiting the current so that reed switches are not damaged
- Testing consistently and not beyond the listed voltage breakdown specifications

Care must be taken to prevent damage to contact surfaces during testing. Uncontrolled voltage breakdown or improper equipment can cause damage to the contact. Examples of this damage include:

- Contact resistance
- Degraded voltage hold-off
- Increased leakage current
- Decreased life performance