

# How to Handle a Reed Switch



Reed Switch Application Notes

# APPLICATION NOTES: How to Handle a Reed Switch

Reed switches consist of two or three metal reed contacts (blades) that are hermetically sealed inside a glass tube. This seal, while strong, may be damaged if proper handling is not used. HSI Sensing has years of experience handling reed switches and have identified several best practices.

## Handling

By design, reed switch raw materials (glass and metal) have a similar coefficient of expansion. They are designed to handle thermal and environmental changes well. The integrity of the glass-to-metal seal must be protected while handling, cutting, bending, mounting, encapsulating, welding, soldering, etc. During modification, care must be taken not to apply excessive mechanical force that could result in hermetic seal damage. Damage can be immediately visible in the form of a cracked seal, but it can also be latent and may only show up over time.

## Drop, Shock, Vibration Warnings

After a reed switch has been dropped or has been subject to excessive physical shock or vibration, always test the reed switch and inspect for physical damage before use in the actual application. Make sure all characteristics are within the acceptable limits. Excessive physical shock or vibration can alter the contact gap size of the switch and/or cause glass damage, both of which could lead to changes in magnetic sensitivity and hermeticity.

## Modification

### Using Ultrasonics

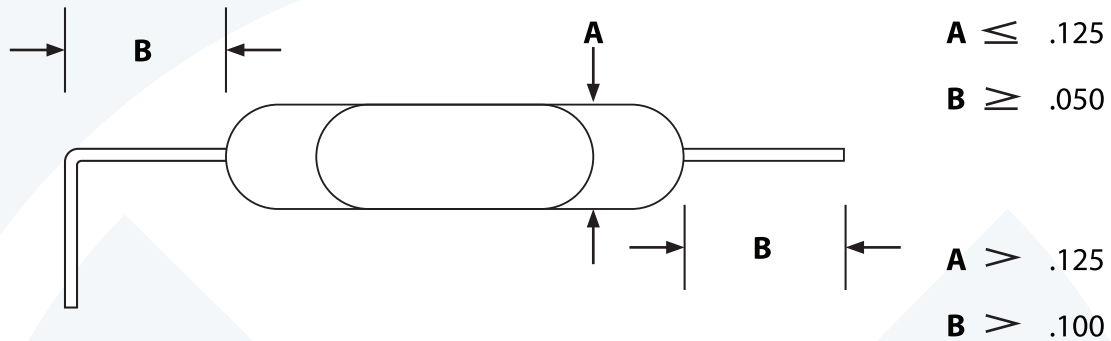
Ultrasonic cleaning or welding can damage the reed switch. Severe damage can occur to the contacts as well as the glass capsule. Be very cautious when using ultrasonics, and perform visual inspections and electrical tests to validate that the switch has not been affected negatively.

### Bending/Forming and Cutting/Cropping

When cutting or bending leads, extreme caution should be exercised not to exert any undue stress that can result in damage or deterioration of the glass-to-metal seal. Proper clamping is necessary.

Recommended distance from end of glass capsule for lead bending and cutting:

- for glass diameter less than 0.125 inches (3.175 mm), no less than 0.050 inches (1.270 mm)
- for glass diameter greater than 0.125 inches (3.175 mm), no less than 0.100 inches (2.540 mm)



As a result of cutting external leads, pull-in and drop-out AT (Ampere Turns) will increase, and magnetic sensitivity will decrease. This should be taken into consideration during design. Bending of external leads will have a similar effect.

When cutting the reed switch leads, ensure the cutting blades are sharp and in good condition. Care should be taken not to allow any shock from cutting the reed switch along the lead and subsequently into the seal. When performing an overall length cut, use of a hard stop is not recommended as it may cause shock to one or both seals. For best quality only cut one reed switch at a time.

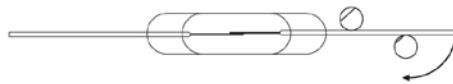
Use of a clamp between the seal and the cut/bend is the preferred method. If a clamping device is not used, the reed switch seal can experience additional stress.

The top and bottom seals of the switch should be inspected for cracks and damage after any modification is performed. HSI Sensing has years of experience cutting, forming and modifying reed switches. To eliminate the risk of quality problems, HSI Sensing can perform these modifications for you using appropriate tooling and fixtures. HSI Sensing can also prepare reed switches to mount on circuit boards.

No clamping – Do not consider



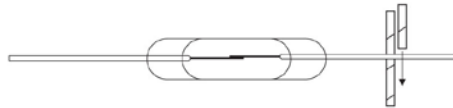
Light clamping – Will reduce seal stress



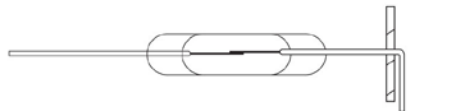
Good Clamping Method



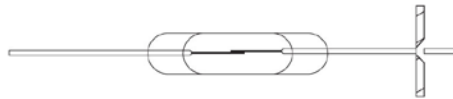
Good Clamping Method



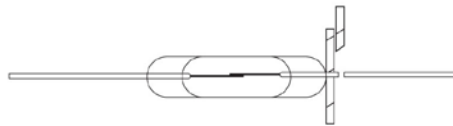
Good Clamping Method



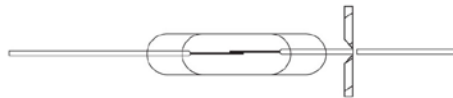
Good Cutter, but no clamping – Consider shock back on the seal



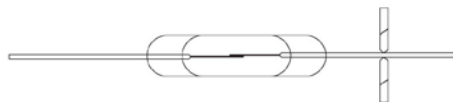
If glass is touching clamp it could be damaged as it is pulled toward the cutter



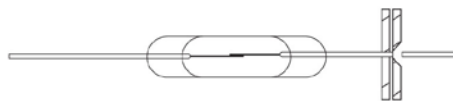
Shock will damage switch



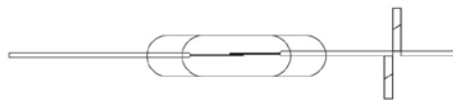
Bad Design – Type of cutter. Chisel cutter sends shock in both directions



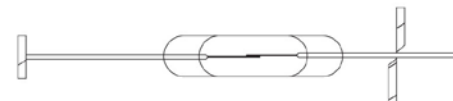
Good Cutter with Good Clamping



Not recommended because of side of rotational stress



Do not put switch in bind. Flexible hard fixed stop to control overall length.



 STOP  CAUTION  GO

## Soldering and Welding

When soldering or welding to a reed switch, certain considerations must be made to avoid glass-to-metal seal damage such as breaking, chipping, cracking, contact damage and hermeticity leakage. HSI Sensing has years of experience soldering and welding to reed switches. To eliminate the risk of quality problems, HSI Sensing can perform these modifications using the appropriate tooling, fixtures, temperature, solder, flux and cleaning procedures.

HSI Sensing offers two external coating options when soldering to a reed switch: electroplated lead-free pure Tin (Sn), or electroplated Gold (Au). When welding to a reed switch, HSI Sensing offers clean reed switch leads (52 Alloy base metal) or electroplated Gold (Au).

A heat sink is recommended between the solder connection and the seal. We recommend soldering at a minimum 0.120 inches (3 mm) from the reed switch seal. Extreme temperature and exposure time may cause damage to the glass capsule and seal. Exposure time and temperature should be kept to a minimum to achieve the proper solder joint. When removing flux after soldering, do not use ultrasonic cleaning baths on reed switches with a normally-closed contact.

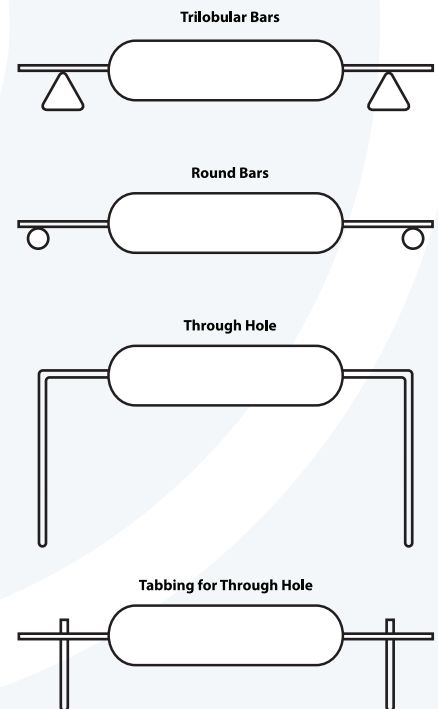
The welding process generates an electro-magnetic field that is capable of operating the switch. This may create an alternate current path that could result in contact damage. Never weld both reed switch leads at the same time, and take precautions when setting current, timing and voltage. Use caution when welding near the glass, as it may cause damage to the glass capsule and seal.

## Printed Circuit Board Mounting

HSI Sensing led the way in developing the methodology for mounting reed switches to printed circuit boards (patent number 5,796,254).

When mounting on a printed circuit board, attention should be given to flexing and thermal expansion characteristics. Using epoxy to secure a reed switch to a printed circuit board or using varnish to coat an already mounted reed switch may cause stress on the reed switch. Stress caused by these factors can lead to glass-to-metal seal damage, such as breaking, chipping, cracking, magnetic function and hermeticity leakage. In typical applications it is better for the mounted reed switch to rely on its own strength. However, if the application requires additional stress protection, HSI Sensing recommends using one of our various proximity sensor configurations.

HSI Sensing has multiple options for mounting reed switches to a printed circuit board: trilobular bars, multiple diameter round bars, bending and tabbing for through hole. HSI Sensing can prepare Form A, Form B, and Form C reed switch types for printed circuit board mounting.



## Potting and Overmold

Applications requiring sealing, potting, encapsulating and overmold processes can cause damage to a reed switch such as breaking, chipping, cracking, magnetic function and hermeticity leakage. Caution should be taken when selecting potting and encapsulating materials due to the linear coefficient of thermal expansion. HSI Sensing recommends using a buffer between the reed switch and the potting, encapsulating, and overmold material. The benefit is enhanced performance in shock and vibration environments. Examples of buffers may include: heat shrink tubing, soft epoxy, and silicone based potting materials.

HSI Sensing has years of experience sealing, potting, encapsulating, and overmolding reed switches. To eliminate the risk of quality problems HSI Sensing can perform these modifications using the appropriate materials.

## Storage

When storing reed switches avoid areas that have a fast thermal change. Also avoid storing near magnetic fields. An oscillating field such as a transformer could activate the reed switch and wear it out prematurely. A large fixed magnetic field holding the normally-open duress contacts of a reed switch closed for extended periods of time may cause the reed switch blades to stick and not release properly. See HSI Sensing specification sheets for proper storage temperature recommendations.