

Reed Switch Protection

The hermetically-sealed reed switch used in GEMS level switches are extremely rugged and designed to operate reliably for many years – 2 million cycles under ideal conditions. To achieve the maximum service life, reed switches benefit from protected electrical supply.

IMPORTANT:

- Don't be misled by the resistive ratings of the switches. Most applications involve inductive loads.
- Don't be misled by the wattage ratings of loads. Low wattage loads are often high inductive devices, making contact protection very important.

Contact Protection Requirements

When switching inductive loads such as relays, solenoids and transformers, reed switch contacts require protection in order to ensure long, dependable life. When current is interrupted, the inductance or electrical inertia of the load generates a large high frequency voltage, which appears across the switch contacts. If the voltage is large enough, it can break down the medium in the gap between them, making a conductive path. This phenomenon, called "arcing," is the spark you see. Arcing can cause the contacts to burn, weld together or stick; thus, giving unreliable performance. The purpose of protection circuits is to prevent arcing, by shorting this voltage through an alternate path.

Recommended Protection

D.C.

A 1N4004 diode (or equivalent) connected cathode-to-positive, as shown in Figure 1, is recommended. The diode does not conduct when the load is energized, but conducts and shorts out the generated voltage when the switch opens. The generated voltage always acts in series with the applied voltage.

A.C.

A resistor and capacitor, connected in parallel with the switch, as shown in Figure 2, is recommended. The capacitor is a high impedance to 60 hertz, but is essentially a short circuit to high frequencies of generated voltages.

Transient suppressors or varistors may also be used to dissipate the transient and protect the switch contacts.

Notes:

1. Don't be misled by low voltage $\leq 10V$, low current $\leq 1MA$ type of loads. These loads may require special gold plating on contact surfaces to operate reliably at these low voltage/low current levels. For long term reliable low current switching action, Gems 20VA switches should be operated at a minimum of 12V to assure contact make; e.g., break through an oxide film which may form over long periods of time.
2. Incandescent lamp loads are very destructive to reed switch applications. These type of loads have a 6-10 time the normal operating current (inrush current) when first energized. This high current level is a prime factor which decreases the life of the switch.
3. The following rating may be used for selection.

$$V_{RMS} = 130 \text{ volts} \quad \text{Energy} = 30\text{-}50 \text{ joules} \quad \text{Peak Amps} = 4000\text{-}6000$$

Gems Sensors available reed-switch protection parts:

- **134579:** has parts for DC (diode) & AC (varistor R.C network) circuits in it
- **134580:** has parts for AC (R.C network) circuit in it
- **59690:** recommended really only for DC applications as the transient varistor can short out over time if used in an AC circuit

The dependable reed switch is at the heart of most level switch shown in this catalog.

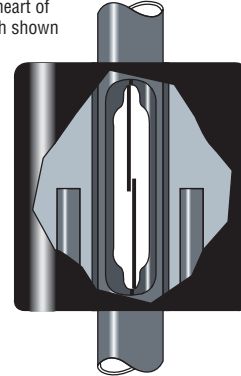


Figure 1
D.C. Contact Protection (Drain the Load)

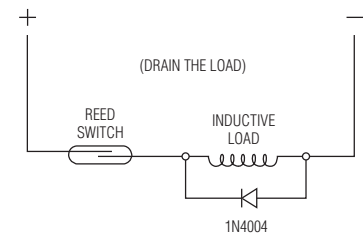
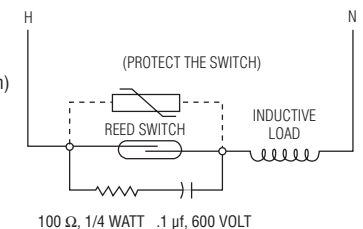


Figure 2
A.C. Contact Protection (Protect the Switch)



Electrical Data

Standard reed switches in GEMS level and flow switch units are hermetically-sealed, magnetically actuated, make-and-break type. Switches are SPST or SPDT, and rated 20 VA. See the chart below for maximum load characteristics of GEMS level switches.

GEMS Sensors Inc. would be pleased to run life tests on our level or flow switches with your specific load, and issue a report indicating the approximate number of cycles that can be expected. U.L. Recognized Units: Switches showing a U.L. listing are rated for 10 VA or 20 VA as shown below.

Switch Rating – Maximum Resistive Load

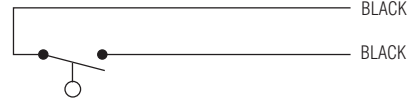
VA	Volts	Amps AC	Amps DC
10 General Use	0-50	.2	.13
	120	.08	N.A.
	100	N.A.	.1
20 Pilot Duty	0-30	.4	.3
	120	.17	.13
	240	.08	.06
50 ¹ General Use	0-50	0.5	0.5
	120	.4	.4
	240	.2	.2
100 ¹	120	.8 ²	N.A.
	240	.4	N.A.

Notes:

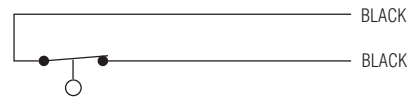
1. Level switch units with 50 VA and 100 VA switches are not U.L. Recognized or CSA Approved.
2. Limited to 50,000 operations.

Typical Wiring Diagrams

SPST, Normally Open - Dry



SPST, Normally Closed - Dry



SPDT, Shown Dry

