Actuation of Reed Switches with a Permanent Magnet
(Examples of switching with the use of a moving magnet.)

Direct Actuation:

A magnet moved perpendicularly towards and away from a Reed Switch turns it off and on once.

A magnet moved parallel to a Reed Switch operates it from one to three times.

A magnet swung towards and away from a Reed Switch operates it once.

A ring magnet moved parallel to a Reed Switchs' axis operates it from one to three times.

In General:

For all Reed Switches the standard pull-in sensitivity is given in the table. Other pull-in sensitivities are available on request.

Contact Form A

Contact Form B

Magnet Biasing Contact

Contact Form B or C

Normally Closed Contact (Form B)

Normally Open Contact (Form C)

Rotation:

Examples of switching through rotational movement.

Indirect Actuation: Shielding

With the stationary arrangement of a Reed Switch and magnet, the contact Reeds are closed. Should the magnetic field be diverted away from the Reed Switch by a shield of ferrous magnetic material placed between the switch and the magnet, the contacts will open. When the shield is removed, the contact Reeds become magnetically actuated and close.

Pull-in Sensitivity:

The given pull-in sensitivity of the Reed Switch has a test equipment tolerance of ± 2 AT.

Life Expectancy:

The life expectancy of a reed switch is dependent upon the load being switched. At maximum rated loads life expectancy is approximately 10^8 switching cycles. Lower load ratings can increase the life expectancy up to 5×10^8 operations. The mechanical life expectancy can reach at least 10^9 operations. Through the switching of inductive, capacitive, and lamp loads, the life expectancy is considerably reduced due to exceeding the specified maximum current.

OTHER PRODUCTS

Dil & Sil Reed Relay

Reed relays consist of a switch and coil assembled into a housing, which could be plastic, metal or moulded.
Compared with electro-mechanical relays, reed relays are smaller in size and generally have a faster response time, lower power consumption and longer life. Compared with solid state relays, reed relays have a real galvanic isolation between input and output. The leakage current and the ON-resistance is much lower. Reed relays also can offer a higher dielectric strength.

Reed Switch

Reed Switches consist of two or three ferromagnetic blades (or reeds) hermetically sealed inside a glass envelope. The construction ensures protection from the external environment. Three types are available: Form A (normally open), Form B (normally closed), and Form C (changeover). Various voltage and current switching levels are available and contact plating materials can be varied to accommodate specific types of load.

Magnetic Proximity Switch

Reed Proximity Switches are operated by a moving magnet and can be used to detect many directions of movement. When the magnet reaches or, the operate distance from the reed switch, the reed switch contacts will operate (open or close). Moving the magnet away will cause the reed switch contacts to switch back to their original position.

Tilt Switch

Tilt switches are used to sense movement (tilt) of a device above and below a horizontal axis. The angle through which the switch must move for proper operation (the differential angle) is measured from the point of just make to just break; it is specified as a maximum. When selecting a tilt switch, it is important to ensure that the operating mechanism will move the switch through an angle greater than the differential angle.

Solid State Relay

Solid State Relays (SSR) manufactured by the Comus Group of companies are sold around the world. The rigid, with no moving parts, means that solid state relays have an almost unlimited life expectancy compared with electromechanical relays. With no mechanical parts there is no contact bounce, no sparks and no mechanical wear making solid state relays the natural choice in working environments where these features are important.

Inductive & Capacitive Proximity

Inductive Proximity sensors can measure ferrous metals. Capacitive Proximity sensors can measure both metal and non-metallic objects, such as iron, water, oil, glass, plastic, etc. The mounting distance will vary depending on the material being sensed. Due to differing object conductivity, permitivity, and water absorption. If the metal connects with ground (GND) then maximum sensing distance will be achieved.

Float Switch

Reed Float Switches are designed to fit into tanks or containers containing liquid. They are operated by magnet fitted into the float assembly and the Reed Switch fitted into the stem of the float tube. When the float moves past the Reed Switch inside the float body, the reed contacts operate (open or close). When the float moves back to its original position the reed switch contacts will also return to their original state.

Hybrid

A Hybrid sensor has multiple sensors and multiple processing techniques to obtain and transmit more information than one could achieve from independent sensors. Standard and custom packaging is available for protection and ease of mounting. Hybrids consist of time proven sensors combined with machine time as little as 2ms.

High Voltage Reed Relay

Reed relays consist of a switch and a coil fitted into a housing which could be plastic, metal or moulded.
Compared with electromechanical relays, reed relays generally have a faster response time, lower coil consumption, and are smaller in size. Furthermore, the switch is sealed in a dry, inert atmosphere, preventing the ingress of contaminants.

Flow Switch

The Flow Switch is designed to fit into a Tee connector within the pipework. The paddle section can be adjusted depending on the size of the pipe. It operates as more flow through the pipe it pushes the paddle up thus triggering the switch.

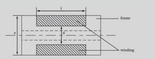
Magnet

Magnets come in various sizes, materials, and coatings. Rare Magnets can be supplied as a separate product or part of a proximity switch set consisting of switch and magnet. Cased Magnets can be supplied as a separate product, where you can select a magnet to suit your application, or as part of a proximity switch set consisting of matching switch and magnet. Materials available are Alnico/Alcomax, Ceramic, Ferrite and Neodymium Iron Boron.

High Breakdown Switch

The HBS line of reed switches is the Comus groups answer to the market demands for a lower cost reed switch that is still capable of handling high voltage applications. The HBS line of reed switches is ideal for custom machines such as Medical applications, for example defibrillation equipment where high reliability and excellent quality is absolutely essential.

STANDARD TEST COILS FOR REED CONTACT UNITS



Configuration of test coils

Test Coil Type	EN119000 Test Coil nr.	Winding length l (mm)	Inside Coil Dia. Ø d (mm)	Outside Coil Dia. Ø e (mm)	Number of Turns	Nominal Co-wire Diam. Ø (mm)	Nominal Resistance (Ohms)
0211	nr. 1	18	3.3	11	5000	0.063	600
0221	nr. 7	15	3.7	11	5000	0.071	450
0231	nr. 13	12	4.4	11	5000	0.071	500
0551	nr. 2	24	4.4	13	5000	0.08	550
1055		13	4.8	14	10000	0.063	2000
1500	nr. 21	40.3	7.3	14.2	10000	0.09	1000
1700	nr. 12	30.5	4.3	14	10000	0.08	1000
1800	nr. 14	23	5.5	15	10000	0.08	1000
	nr. 18	25.4	7.6	15.1	10000	0.071	1100
PSC	-	25.4	8.75	14	5000	0.1016	400

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We also have a large network of worldwide agents. These can be seen on any of our websites, or on our company profile brochure.

Comus Group of Companies

Comus Reed Switches

DESCRIPTION

Reed Switches consist of two or three ferromagnetic blades (or reeds) hermetically sealed inside a glass envelope. The construction ensures protection from the external environment. Three types are available: Form A (normally open), Form B (normally closed), and Form C (changeover). Form B reed switches are obtained by two methods: By using the normally closed blade of a Form C switch, or, by using a Form A switch, and biasing the contacts closed using a small block magnet. The switch is then able to re-open by the use of another stronger external magnet of opposite polarity. Sensitivity of a reed switch is measured in ampere turns (A.T.) and it should be noted that lower switch (A.T.) ratings are more sensitive as they require less magnetic field strength to operate them. Various voltage and current switching levels are available and contact plating materials can be varied to accommodate specific types of load.

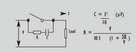
OPERATION

Reed switches are operated by a magnetic field, via a magnet or a current carrying coil. When the field is removed the switch reverts to its previous state.
Operation by a magnet can be achieved in a large variety of ways, either moving the magnet toward and away from the reed either perpendicularly, or parallel to the glass.
Reed switches are used in a variety of Comus Group products including Proximity Switches, Float Switches and Reed Relays. They are also available in moulded packages affording protection from damage and Surface Mount styles.

CONTACT PROTECTION

Inductive Loads

A reverse voltage is generated by stored energy in an inductive load when the reed contacts open. This voltage can reach very high levels and is capable of damaging the contacts. An RC network may be used as shown below to give protection.



Capacitive Loads

Unlike inductive loads, capacitive and lamp loads are prone to high inrush currents which can lead to faulty operation and even contact welding.
When switching charged capacitors (including cable capacitance) a sudden unloading can occur, the intensity of which is determined by the capacity and length of the connecting leads to the switch. This inrush peak can be reduced by a series of resistors. The value is dependent on the particular application but should be as high as possible to ensure that the inrush current is within the allowable limits.

The above diagram illustrates a resistor/capacitor network for protecting a Reed Switch against high inrush currents. R_1 and/or R_2 are used depending upon circuit conditions.

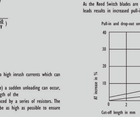
Lamp Loads

With lamp load applications it is important to note that cold lamp filaments have a resistance 10 times smaller than already glowing filaments. This means that when being turned on, the lamp filament experiences a current flow 10 times greater than when already lowered and may blow the reed contact before the reduced to an acceptable level through the use of a series of current-limiting resistors. Another possibility is the parallel switching of a resistor across the switch. This allows just enough current to flow in the filament to keep it warm, yet not enough to make it glow.

Lamp load with parallel or current limiting resistor across the switch

Cutting and Bending:

As the Reed Switch blades are part of the magnetic circuit of a Reed Switch shortening the leads results in increased pull-in and drop-out values.



When cutting or bending Reed Switches, it is important that the glass body should not be damaged. Therefore, the cutting or bending point should be no closer than 3mm(.118) to the glass body.

COMUS REED SWITCHES

RoHS Compliant
UL Recognized
E103299/E70063/E12629

Features	• Ultra Miniature SMD Reed	ATE Ultra Miniature Reed	• ATE Ultra Miniature Reed	ATE Ultra Miniature Reed • Superior Life Expectancy	• Small Construction • Fastest Switching Time	• General Purpose Ultra Miniature Reed	• Ultra Miniature Reed	• Small Construction • Fastest Switching Time	• General Purpose Miniature	• Moisture Offset	• ATE Pico Reed	• High Power Pico Reed	• General Purpose Close Differential Pico Reed	• General Purpose Pico Reed	• General Purpose Pico Reed	• Miniature High Performance	• General Purpose Miniature
Supplier	Coto	Coto	Coto	Coto	OKI	Coto	Coto	OKI	Comus	OKI	Coto	Coto	Coto	Coto	Coto	OKI	OKI
Type	RI-80SMD	RI-80	RI-70	RI-71	OKD213	RI-82	RI-60	OKD211	GC5522	OKD219	OKI0221	RI-27	RI-29	RI-05	RI-07	RI-01C	ORD324
Contact Form	A	A	A	A	A	A	A	A	A	A	A (offset)	A	A	A	A	A	A
Contact Material	Sputtered Ru	Sputtered Ru	Sputtered Ru	Sputtered Ru	Rh	Ru	Sputtered Ru	Rh	Rh	Rh	Rh	Sputtered Ru	Ru	Ru	Ru	Ru	Ir Plated
Switching Capacity Max. W/VA	5	5	10	10	1	10	10	1	6	10	10	10	20	10	10	10	10
Switching Voltage Max. VDC/AC	175	175	170	170	24	200	200	24	140	100	100	200	200	200	200	200	100
Switching Current Max. A	0.35	0.35	0.5	0.5	0.1	0.5	0.5	0.1	0.5	0.5	0.3	0.5	1.0	0.4	0.5	0.5	0.5
Carry Current Max. A	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.3	0.8	1.0	1.0	1.75	1.25	1.75	1.75	1.75	1.0
Breakdown Voltage Min. VDC	230	230	210	210	150	200	230	150	200	150	150	180	250	230	180	180	250
Contact Resistance Max. mOhms	160	160	150	150	200	150	125	100	150	100	100	115	115	150	130	100	100
Insulation Resistance Min. Ohms	10^{12}	10^{12}	10^{12}	10^{12}	10^{9}	10^{13}	10^{12}	10^{9}	10^{14}	10^{9}	10^{9}	10^{13}	10^{13}	10^{13}	10^{13}	10^{13}	10^{10}
Pull-in Sensitivity AT	5 - 15	5 - 15	7 - 21	7 - 21	10 - 40	7 - 21	7 - 21	10 - 40	10 - 30	10 - 30	10 - 30	10 - 34	16 - 34	7 - 25	7 - 36	7 - 25	10 - 40
Drop-out Sensitivity AT	2 - 13	2 - 13	3 - 16	3 - 16	5 Min.	3 - 16	3 - 16	5 Min.	5 Min.	5 Min.	5 Min.	4 - 19.5	5 - 19.5	70 - 75% PI	3 - 19.5	3 - 18	4 Min.
Operate Time Max. ms	0.35	0.35	0.15	0.15	0.3	0.3	0.15	0.3	1.0	0.4	0.4	0.25	0.25	0.3	0.45	0.35	0.4
Bounce Time Max. ms	0.1	0.1	0.035	0.035	0.3	0.1	0.035	0.3	0.3	0.3	0.5	0.05	0.05	0.15	0.05	0.1	0.3
Release Time Max. ms	0.02	0.02	0.035	0.035	0.05	0.07	0.02	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.05	0.05
Resonant Frequency Typ. Hz	21300	21300	17900	17900	11000	10800	11300	7500	6000	5900	2750	6700	6500	5500	6700	6700	5000
Operating Frequency Max. Hz	170	170	125	125	500	125	125	500	400	500	500	170	100	170	170	100	500
Vibration (10-1000Hz) g	10	10	10	10	20	10	10	20	15	20	20	10	10	10	10	10	20
Shock (11ms) g	150	150	100	100	30	150	100	30	50	30	30	150	150	150	150	150	30
Capacitance Typ. pF	0.45	0.45	0.35	0.35	0.4	0.3	0.25	0.2	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Operating Temp. Range Deg. °C	-55 +125	-55 +125	-55 +125	-55 +125	-40 +125	-55 +125	-55 +125	-40 +125	-40 +125	-40 +125	-40 +125	-55 +125	-55 +75	-55 +75	-55 +125	-55 +125	-40 +125
Test Coil Type	PSC	PSC	PSC	PSC	0211	1035	0221	0211	1035	0221	0221	PSC	PSC	PSC	PSC	PSC	PSC

Features	• Micro Reed	AC Line Voltage Micro Reed	• High Power Micro Reed	• Close Differential Micro Reed	• General Purpose Close Differential Micro Reed	• General Purpose Micro Reed	• General Purpose Micro Reed	• Lowest pull-in sensitivity • High switching speed • High breakdown voltage	• Stable, low contact resistance • Suitable for dynamic measure	• High Voltage Switching • High Breakdown Voltage	• High Switching Capability • High Breakdown Voltage	• High Power Micro Reed	• Ultra High Power Micro Reed	• High Power
Supplier	Coto	Coto	Coto	Coto	Coto	Coto	Coto	Comus	Comus	Comus	Comus	Coto	Coto	OKI
Type	RI-23	RI-21	RI-25	RI-26	RI-06	RI-03	RI-01B	GC3322	GC3315	GC3314	GC2722	GC2717	GC3723	GC3717	RI-46	RI-48	OKD2210
Contact Form	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Contact Material	Plated Ru	Plated Ru	Sputtered Ru	Sputtered Ru	Ru	Ru	Ru	Rh	Rh	Rh	Rh	Rh	Rh	Rh	Sputtered Ru	Sputtered Ru	Rh
Switching Capacity Max. W/VA	10	10	25	20	10	10	10	10	10	10	12	10	40	40	40	70	DC50W / AC100VA
Switching Voltage Max. VDC/AC	200	200	200	200	200	200	200	150	400	400	230	500	230	400	250	350	DC200 / AC150
Switching Current Max. A	0.5	0.5	1.0	1.0	0.4	0.5	0.5	0.5	0.5	0.5	1.0	0.5	2.0	2.0	1.0	1.0	DC1.0 / AC0.7
Carry Current Max. A	2.75	2.75	3	1.75	2.5	2.5	1.25	1.0	1.0	1.0	2.0	1.0	3.0	3.0	3	2.25	2.5
Breakdown Voltage Min. VDC	200	225	200	275	200	200	200	200 250 (P12±15)	350 450 (P12±15)	500 700 (P12±15)	400	1300	200 400 (P12±39)	500 1000 (P12±39)	300	600	250min.(P12±39)
Contact Resistance Max. mOhms	100	100	100	110	150	120	100	150	150	150	100	100	100	100	90	90	100
Insulation Resistance Min. Ohms	10^{13}	10^{13}	10^{13}	10^{13}	10^{13}	10^{13}	10^{13}	10^{10}	10^{10}	10^{10}	10^{11}	10^{11}	10^{11}	10^{11}	10^{11}	10^{11}	10^{10}
Pull-in Sensitivity AT	8 - 70	8 - 70	8 - 70	14 - 52	6 - 32	6 - 52	6 - 32	10 - 35	10 - 35	10 - 35	20 - 50	20 - 50	15 - 50	15 - 50	10 - 70	15 - 70	15 - 60
Drop-out Sensitivity AT	4 - 32	4 - 32	4 - 32	70 - 80%	65 - 75%	3 - 36	3 - 27	5 Min.	5 Min.	5 Min.	5 Min.	5 Min.	15 Min.	15 Min.	4 - 22.5	8 - 32	7 Min.
Operate Time Max. ms	0.25	0.25	0.25	0.3	0.3	0.25	0.25	1.0	1.0	1.0	2.0	2.0	2.0	2.0	0.35	0.35	0.6
Bounce Time Max. ms	0.15	0.1	0.15	0.03	0.15	0.15	0.15	0.2	0.2	0.2	0.5	0.5	0.5	0.5	0.15	0.15	0.5
Release Time Max. ms	0.07	0.07	0.07	0.03	0.07	0.07	0.07	0.05	0.05	0.05	0.10	0.10	0.10	0.10	0.03	0.03	0.05
Resonant Frequency Typ. Hz	5500	5500	5100	5500	5500	5500	5500	5000	5000	5000	2900	2900	4200	4200	3200	3200	2500
Operating Frequency Max. Hz	170	100	50	125	170	170	100	200	200	200	200	200	300	300	125	125	500
Vibration (10-1000Hz) g	10	10	10	10	10	10	10	35	35	35	35	35	35	35	10	10	20
Shock (11ms) g	150	150	150	50	150	150	150	50	50	50	50	50	50	50	500	500	30
Capacitance Typ. pF	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.7	0.7	0.7	0.5	0.5	0.5	0.5	0.2	0.2	0.5
Operating Temp. Range Deg. °C	-55 +125	-55 +125	-55 +125	-55 +125	-55 +125	-55 +125	-55 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-55 +125	-55 +125	-40 +125
Test Coil Type	PSC	PSC	PSC	PSC	PSC	PSC	PSC	1035	1035	1035	1700	1700	1700	1700	PSC	PSC	0229

Features	• Vacuum High Power • High Breakdown Voltage	• High Breakdown voltage • High Switching Power	• High Switching current	• High Switching current • High Breakdown voltage	• High Breakdown voltage • High Switching capability	• High Breakdown voltage • High Switching voltage	• High Switching capability	• General purpose reed switch	• High Switching current • High Breakdown voltage • Vacuum Technology			• Micro Changeover Switch	• Economical change-over switches		• High capability/size ratio • High Power Change-over Switch		• High Switching capability • High Breakdown voltage	• High Switching capability
Supplier	OKI	OKI	Comus	Comus	Comus	Comus	Comus	Comus	Comus	Comus	Comus	Coto	Comus	OKI	Comus	Comus	Comus	Comus	Comus
Type	ORD2210W	OKD229	GC3823	GC3817	GC1513	GC1517	GC1523	GC1525	HBS-7KVDC	HBS-10KVDC	HBS-15KVDC	RI-90	GC3525	OKT551	GC3336	GC3436	GC1917	GC1625
Contact Form	A	A	A	A	A	A	A	A	A	A	A	C	C	C	C	C	C	C
Contact Material	Rh	Rh	Rh	Rh	Rh	Rh	Rh	Rh	W	W	W	Ru	Rh	Rh	Rh	Rh	Rh	Rh
Switching Capacity Max. W/VA	100	DC50 / AC70	60	60	120	30	120	80	50	50	50	5	5	3	20	20	60	60
Switching Voltage Max. VDC/AC	DC350 / AC300	DC350 / AC300	230	400	1500	1500	250	250	5000	7500	10000	175	100	30	150	150	400	230
Switching Current Max. A	DC1.0	DC0.7 / AC0.5	3.0	3.0	3.0	1.0	3.0	1.3	3.0	3.0	3.0	0.4	0.5	0.2	1.0	1.0	1.0	1.0
Carry Current Max. A	2.5	2.5	4.0	4.0	5.0	2.0	5.0	2.0	5.0	5.0	5.0	0.5	1.0	0.5	2.0	2.0	2.0	2.0
Breakdown Voltage Min. VDC	1000min.	500	400 500 (P12±50)	850 1000 (P12±50)	1500 3000 (P12±75)	1500 3000 (P12±75)	500 800 (P12±75)	500 800 (P12±75)	7000	10000	15000	200	200	200min.(P12±20)	200	200	350 1000 (P12±20)	400
Contact Resistance Max. mOhms	100	100	100	100	100	100	100	100	100	100	100	120	150	100	150	150	150	100
Insulation Resistance Min. Ohms	10^{10}	10^{10}	10^{11}	10^{11}	10^{11}	10^{11}	10^{11}	10^{11}	10^{10}	10^{10}	10^{10}	10^{9}	10^{9}	10^{9}	10^{9}	10^{9}	10^{9}	10^{9}
Pull-in Sensitivity AT	20 - 60	20 - 60	10 - 70	10 - 70	60 - 95	60 - 95	30 - 95	30 - 95	90 - 170	90 - 200	120 - 200	15 - 40	15 - 50	10 - 30	15 - 30	15 - 30	40 - 100	80 - 120
Drop-out Sensitivity AT	7 Min.	6 Min.	15 Min.	15 Min.	30 Min.	25 Min.	30 Min.	25 Min.	40 Min.	40 Min.	40 Min.	5 Min.	8 Min.	4 Min.	5 Min.	5 Min.	20 Min.	20 Min.
Operate Time Max. ms	0.6	0.6	2.5	2.5	3.5	3.5	3.5	3.5	1.8	1.8	1.8	2.5	1.5	1.0	2.0	2.0	4.0	4.0
Bounce Time Max. ms	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.8	1.8	1.8	0.3	0.6	1.5	0.6	0.6	0.5	0.5
Release Time Max. ms	0.05	0.05	-	0.10	0.2	0.2	0.2	0.2	0.5	0.5	0.5	1.0	0.5	0.5	0.5	0.5	0.15	0.10
Resonant Frequency Typ. Hz	2500	3500	3400	3400	900	900	900	900	-	-	-	TBD	-	4000	-	-	-	-
Operating Frequency Max. Hz	500	500	200	200	100	100	100	100	5	5	5	100	250	200	250	250	100	100
Vibration (10-1000Hz) g	20	20	35	35	35	35	35	35	35	35	35	-	30	20	20	20	35	35
Shock (11ms) g	30	30	50	50	50	50	50	50	40	40	40	-	50	30	50	50	50	50
Capacitance Typ. pF	0.5	0.5	0.5	0.5	0.8	0.8	0.8	0.8	0.5	0.5	0.5	0.8	1.5	1.5	0.8	0.8	1.0	1.0
Operating Temp. Range Deg. °C	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-55 +125	-55 +125	-55 +125	-55 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125
Test Coil Type	0229	0229	1800	1800	1500	1500	1500	1500	MARK RI-43-640 or EN 119000 No.16	MARK RI-43-640 or EN 119000 No.16	MARK RI-43-640 or EN 119000 No.16	PSC	1035	0551	1035	1035	1500	1500