The Comus Group of Companies

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.

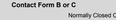
In General:

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

Contact Form B or C



All dimensions are nominal, in millimeters unless otherwise stated. If further information is required, individual datasheets are available on our websites. As part of the group's policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

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 between the magnet from the Reed Switch by a shield of ferromagnetic 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 10⁸ switching cycles. Lower load ratings can increase the life expectancy up to 5x10⁸ operations. The mechanical life expectancy can reach at least 10⁹ operations. Through the switching of inductive, capacitive, and lamp loads, the life expectancy is considerably reduced due to exceeding the specified maximum current.

The Comus International product groups:

Gunther / Comus Reed Switches

A reed switch consists of two or three ferromagnetic and specially shaped contact blades (reeds). They are positioned in a hermetically sealed glass tube in a protective atmosphere. The plated contact surfaces are isolated from the outside environment, which protects the contacts from contamination. Reed switches are available as form A (normally open) and form C (changeover) in standard lengths, customer specific modifications or SMD versions.

Proximity Switches

Proximity switches and sensors use a reed switch and a permanent magget. Each is encased in a plastic or metal housing for protection and ease of mounting. Proximity switches and sensors are manufactured in a wide variety of packaged styles. There are a number of different technologies determined by the application.

Reed Relays

Reed relays come in a variety of forms and styles. Depending on the application, only one relay type may be suitable. Reed relays have physical contacts that are magnetically actuated to open or close a path. They consist of a coil wrapped around reed switches. The reed switch is composed of two overlapping ferromagnetic blades (called reeds) hermetically sealed within a glass capsule that is filled with an inert gas. When the coil is energized, the two reeds are drawn together such that they complete a path through the relay. When the coil is de-energized, the spring force in the reeds pulls the contacts apart (open).

Solid State Relays

A SSR is a semiconductor device that can be used in place of a mechanical relay to switch electricity to a load in many applications. Solid state relays are purely electronic. SSRs typically feature electrical isolation to several thousand volts between the control and load sides. Because of this isolation, the load side of the relay is actually powered by the switched line; both line voltage and a load (not to mention a control signal) must be present for the relay to operate.

Smart Sensors

When customers need a bit more than the standard product offering from Comus we turn to our Smart Sensor line as a possible solution. A Smart sensor utilizes multiple sensing technologies and processing techniques in a package uniquely tailored for various environments giving our customers a turnkey package solution that will transmit more information than using independent sensors. These packages typically comprise of one or more existing Comus sensing technology types. Smart Sensors can be designed to detect angle, shock, magnetic field or ferrous metal, acceleration and g-force.

Float Switches

These switches are used to monitor liquid levels by opening or closing when a desired action point is reached. A variety of types are available using mercury and non-mercury tilt switches and, also, permanent magnets and reed switches.

Tilt & Tip-Over Switches

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 in our datasheets.
Tip-over switches sense tilt over 360° of a vertical axis. A tip-over switch uses operating angle to describe the angle from vertical to the point of contact operation, subject to a tolerance, i.e. 45° ± 10° (35° to 55°). Both normally closed (tilt to open) and normally open (tilt to close) switches are available as are omnidirectional and one plane only versions.

Alarm & Security Switches

Alarm and security switches are cost effective with high quality and are especially made for security purposes. They come with an extensive product range that includes; recessed cylindrical contact switches, robust aluminum switches, adjustable plunger switches and tamper proof draw switches. Both switches and magnets are available separately.

The Comus International group of companies consists of:

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We also have a large network of worldwide agents. These can be seen on any of our website.

Com/15to16/Iss.2

SENSING THE WORLD'S NEEDS

REED SWITCHES
From the Comus Group of Companies

OUR MISSION STATEMENT

At Comus we take pride in being renown in the industry as a leader in providing the very best in service to our clients. Our lasting commitment is to meet the ever changing necessities of our customers and the markets they serve; to continually improve our processes and our products. To pioneer developments and sensors that use less power while never sacrificing quality or function. To expand our product knowledge and diversification so that we may continue our mission of "Sensing the world's needs."
– President & CEO Robert P Romano

ABOUT COMUS

Comus International was founded in June 1978 by our President and CEO, Robert P. Romano.

Comus International started out as a manufacturer of glass mercury tilt switches for residential and commercial thermostats. Immediate success and rapid growth led to new product development and soon the metal mercury switch and, ultimately, the patented non-mercury switch were designed and offered to the market which led to further success.

Today, Comus International is a leading manufacturer of tilt and tip-over switches, motion/vibration sensors, reed switches, reed relays, solid state relays, proximity sensors, float switches and a wide variety of custom turnkey sensors. Success of our product growth and offering has been built with an excellent reputation for quality and service.

Comus has evolved into a world leader in the design, development and manufacture of a wide variety of sensors and sensor-related products. Applications are found in such diverse market segments as medical, automotive, white goods, alarm and security, and military/aerospace.

Our success through the past several decades is a combination of continual organic and acquisition growth, leading to the formation of the Comus Group of companies. Divisions include the following:

- Comus Europe and Active Switch and Sensor in Essex – England.
- Comus International BVBA in Belgium.
- Comus Technology B.V. in The Netherlands.
- STG India and Comus India.
- Computer Components Inc. in the United States.

The Comus Group of Companies is now one of the largest manufacturers in the sensor industry.

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 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.

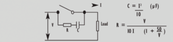
OPERATION

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 now available in housed packages affording protection from damage and Surface Mount styles.

CONTACT PROTECTION

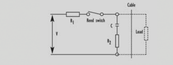
Inductive Loads

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.

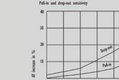
Lamp Loads

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 glowing. This high inrush current can be 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 to 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.

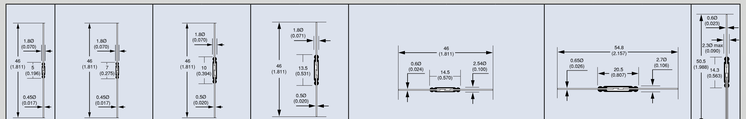


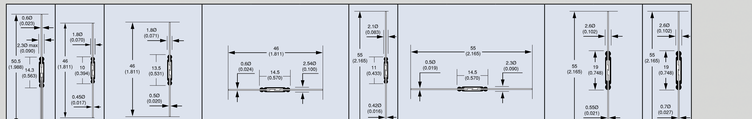
When cutting or bending Reed Switches, it is important that the glass body should not be damaged. Therefore, the cutting or bending point should be no closer than 3mm (1/8) to the glass body.

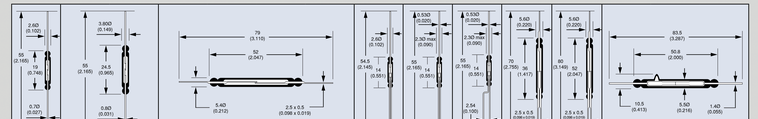
All dimensions are nominal, in millimeters unless otherwise stated. If further information is required, individual datasheets are available on our websites. As part of the group's policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

REED SWITCHES

RoHS Compliant







Series			RI-80	RI-70	RI-71	RI-60	RI-69	RI-27	RI-29	RI-23	RI-21	RI-25	RI-26	RI-46	RI-48	RI-48V	RI-90
Glass Length		mm (in)	5.0 (0.196)	7.0 (0.275)	7.0 (0.275)	10.0 (0.394)	10.0 (0.394)	13.5 (0.531)	13.5 (0.531)	14.5 (0.570)	14.5 (0.570)	14.5 (0.570)	14.5 (0.570)	20.5 (0.807)	20.5 (0.807)	20.5 (0.807)	14.3 (0.563)
Contact Form			A	A	A	A	A	A	A	A	A	A	A	A	A	A	C
Contact Material			Sputtered Ru	Sputtered Ru	Sputtered Ru	Sputtered Ru	Sputtered Ru	Sputtered Ru	Sputtered Ru	Plated Ru	Plated Ru	Sputtered Ru	Sputtered Ru	Sputtered Ru	Sputtered Ru	Sputtered Ru	Ru
Switching Power	Max.	W/VA	5	10	10	10	20	10	20	10	10	25	20	40	70	70	5
Switching Voltage	Max.	VDC/AC	175	170	170	200	200	200	200	200	200	200	200	250	250	250	175
Switching Current	Max.	A	0,35	0.5	0.5	0.5	1.0	0.5	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0	0.4
Carry Current	Max.	A	0.5	0.5	0.5	0.5	1.0	1.75	1.25	2.75	2.75	3	1.75	3.0	2.25	2.25	0.5
Breakdown Voltage	Min.	VDC	230	210	210	230	230	180	250	200	225	200	275	300	400	1000	200
Contact Resistance	Max.	mOhms	160	150	150	125	125	115	115	100	100	100	110	90	90	90	140
Insulation Resistance	Min.	Ohms	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{9}
Pull-in Sensitivity		AT	5 - 15	7 - 21	7 - 21	7 - 21	7 - 21	10 - 34	16 - 34	8 - 70	8 - 70	8 - 70	14 - 52	10 - 70	15 - 70	15 - 70	15 - 30
Drop-out Sensitivity		AT	2 - 13	3 - 16	3 - 16	3 - 16	3 - 16	4 - 19.5	5 - 19.5	4 - 32	4 - 32	4 - 32	70 - 80%	4 - 22.5	8 - 32	8 - 32	5 Min.
Operate Time	Max.	ms	0,35	0.15	0.15	0.15	0.15	0.25	0.25	0.25	0.25	0.25	0.3	0.35	0.35	0.35	1.0
Bounce Time	Max.	ms	0.1	0.035	0.035	0.035	0.035	0.05	0.05	0.15	0.1	0.15	0.03	0.15	0.15	0.15	1.5
Release Time	Max.	ms	0,02	0.035	0.035	0.02	0.02	0.03	0.03	0.07	0.07	0.07	0.03	0.03	0.03	0.03	1.0
Resonant Frequency	Typ.	Hz	21300	17900	17900	11300	11300	6700	6500	5500	5500	5100	5500	3200	3200	3200	TBD
Operating Frequency	Max.	Hz	170	125	125	125	125	170	100	170	100	50	125	125	125	125	100
Vibration (10-1000 Hz)		g	10	10	10	10	10	10	10	10	10	10	10	10	10	10	-
Shock (11 ms)		g	150	100	100	100	100	150	150	150	150	150	50	500	500	500	-
Capacitance	Typ.	pF	0,45	0.35	0.35	0.25	0.25	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.8
Operating Temp. Range	Deg.	°C	-55 +125	-55 +125	-55 +125	-55 +125	-55 +75	-55 +125	-55 +75	-55 +125	-55 +125	-55 +125	-55 +125	-55 +125	-55 +125	-55 +125	-55 +125
Test Coil	Type		PSC	PSC	PSC	PSC	PSC	PSC	PSC	PSC	PSC	PSC	PSC	PSC	PSC	PSC	PSC
Options / Features			• Ideal for ATE Switching • SMD Version Available • Custom Cut & Bend	• Ideal for ATE Switching • Superior Life Expectancy • Custom Cut & Bend	• Ideal for ATE Switching • SMD Version Available • Custom Cut & Bend	• High Power Switching • SMD Version Available • Custom Cut & Bend	• Ideal for ATE Switching • SMD Version Available • Custom Cut & Bend	• Custom Cut & Bend	• Ideal for AC Line Voltage • Custom Cut & Bend	• High Power Applications • Custom Cut & Bend	• Close Differential • Custom Cut & Bend	• High Power Applications • Custom Cut & Bend		• High Voltage Applications • Custom Cut & Bend	• Ideal for ATE Switching • Changeover Switch • Custom Cut & Bend	

Series			RI-91	RI-02	RI-07	RI-01C	RI-06	RI-03	RI-01B	GC2522	GC2322	GC2315	GC2314	GC2722	GC2717	GC3723
Glass Length		mm (in)	14.3 (0.563)	10.0 (0.394)	13.5 (0.531)	13.5 (0.531)	14.5 (0.570)	14.5 (0.570)	14.5 (0.570)	11.0 (0.433)	14.5 (0.570)	14.5 (0.570)	14.5 (0.570)	19.0 (0.748)	19.0 (0.748)	19.0 (0.748)
Contact Form			C	A	A	A	A	A	A	A	A	A	A	A	A	A
Contact Material			Ru	Ru	Ru	Ru	Ru	Ru	Ru	Rh	Rh	Rh	Rh	Rh	Rh	Rh
Switching Power	Max.	W/VA	10	10	10	10	10	10	10	6	10	10	10	12	10	40
Switching Voltage	Max.	VDC/AC	175	200	200	200	200	200	200	140	150	400	400	230	500	230
Switching Current	Max.	A	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	1.0	0.5	2.0
Carry Current	Max.	A	0.5	0.5	1.75	1.75	2.5	2.5	1.25	0.8	1.0	1.0	1.0	2.0	1.0	3.0
Breakdown Voltage	Min.	VDC	200	200	180	180	200	200	200	200	200 250 (P1 ≥ 15)	200 450 (P1 ≥ 15)	500 700 (P1 ≥ 15)	400	1300	200 400 (P1 ≥ 30)
Contact Resistance	Max.	mOhms	140	150	130	150	150	120	100^{2}	150	150	150	150	100	100	100
Insulation Resistance	Min.	Ohms	10^{9}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{10}	10^{12}	10^{11}	10^{11}	10^{11}	10^{11}	10^{11}
Pull-in Sensitivity		AT	15 - 30	7 - 21	7 - 30	7 - 25	6 - 32	6 - 52	6 - 32	10 - 40	10 - 35	10 - 35	10 - 35	20 - 50	20 - 50	15 - 50
Drop-out Sensitivity		AT	5 Min.	3 - 16	3 - 19.5	3 - 18	65 - 75%	3 - 36	3 - 27	5 Min.	5 Min.	5 Min.	5 Min.	5 Min.	5 Min.	15 Min.
Operate Time	Max.	ms	1.0	0.3	0.45	0.35	0.3	0.25	0.25	1.0	1.0	1.0	1.0	2.0	2.0	2.0
Bounce Time	Max.	ms	1.5	0.1	0.05	0.1	0.15	0.15	0.15	0.3	0.2	0.2	0.2	0.5	0.5	0.5
Release Time	Max.	ms	1.0	0.07	0.03	0.05	0.07	0.07	0.07	0.05	0.05	0.05	0.05	0.10	0.10	0.10
Resonant Frequency	Typ.	Hz	TBD	10800	6700	6700	5500	5500	5500	6000	5000	5000	5000	2900	2900	4200
Operating Frequency	Max.	Hz	100	125	170	100	170	170	100	400	200	200	200	200	200	300
Vibration (10-1000 Hz)		g	-	10	10	10	10	10	10	35	35	35	35	35	35	35
Shock (11 ms)		g	-	150	150	150	150	150	150	50	50	50	50	50	50	50
Capacitance	Typ.	pF	0.8	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.7	0.7	0.7	0.5	0.5	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
Test Coil	Type		PSC	PSC	PSC	PSC	PSC	PSC	PSC	1035	1035	1035	1035	1700	1700	1700
Options / Features			• Ideal for ATE Switching • Changeover Switch • Custom Cut & Bend	• General Purpose • SMD Version Available • Custom Cut & Bend	• General Purpose • SMD Version Available • Custom Cut & Bend		• General Purpose • Close Differential • Custom Cut & Bend	• General Purpose • Custom Cut & Bend	• General Purpose • SMD Version Available • Custom Cut & Bend	• General Purpose • Custom Cut & Bend	• Lowest Pull-in Sensitivity • High Switching Speed • High Breakdown Voltage • Custom Cut & Bend		• Stable Low Contact Resistance • Custom Cut & Bend	• High Voltage Switching • High Break-down Voltage • Custom Cut & Bend	• High Break-down Voltage • Custom Cut & Bend

Series			GC3717	GC3823	GC3817	GC1513	GC1517	GC1523	GC1525	GC3525	GC3336	GC3436	GC1917	GC1625	GC6515	GC6516	GC6517
Glass Length		mm (in)	19.0 (0.748)	24.5 (0.965)	24.5 (0.965)	52.0 (2.047)	52.0 (2.047)	52.0 (2.047)	52.0 (2.047)	14.0 (0.551)	14.0 (0.551)	14.0 (0.551)	36.0 (1.417)	52.0 (2.047)	50.8 (2.000)	50.8 (2.000)	50.8 (2.000)
Contact Form			A	A	A	A	A	A	A	C	C	C	C	C	A	A	A
Contact Material			Rh	Rh	Rh	Rh	Rh	Rh	Rh	Rh	Rh	Rh	Rh	Rh	W	W	W
Switching Power	Max.	W/VA	40	60	60	120	30	120	80	5	20	60	60	50	50	50	50
Switching Voltage	Max.	VDC/AC	400	230	400	1500	1500	250	250	100	150	150	400	230	5000	7500	10000
Switching Current	Max.	A	2.0	3.0	3.0	3.0	1.0	3.0	1.3	0.5	1.0	1.0	1.0	1.0	2.0	2.0	2.0
Carry Current	Max.	A	3.0	4.0	4.0	5.0	2.0	5.0	2.0	1.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0
Breakdown Voltage	Min.	VDC	500 1000 (P1 ≥ 30)	400 500 (P1 ≥ 50)	850 1000 (P1 ≥ 50)	1500 3000 (P1 ≥ 75)	1500 3000 (P1 ≥ 75)	500 800 (P1 ≥ 75)	500 800 (P1 ≥ 75)	200	200	200	750 1000 (P1 ≥ 50)	400	7000	10000	14000
Contact Resistance	Max.	mOhms	100	100	100	100	100	100	100	150	150	150	100	100	100	100	100
Insulation Resistance	Min.	Ohms	10^{11}	10^{11}	10^{11}	10^{11}	10^{11}	10^{11}	10^{11}	10^{9}	10^{9}	10^{9}	10^{9}	10^{9}	10^{12}	10^{12}	10^{12}
Pull-in Sensitivity		AT	15 - 50	30 - 70	30 - 70	60 - 95	60 - 95	30 - 95	30 - 95	15 - 50	15 - 30	15 - 30	40 - 100	80 - 120	100 - 170	100 - 180	120 - 200
Drop-out Sensitivity		AT	15 Min.	15 Min.	15 Min.	30 Min.	25 Min.	30 Min.	25 Min.	8 Min.	5 Min.	5 Min.	20 Min.	20 Min.	-	-	-
Operate Time	Max.	ms	2.0	2.5	2.5	3.5	3.5	3.5	3.5	1.5	2.0	2.0	1.5	1.5	1.8	1.8	1.8
Bounce Time	Max.	ms	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.5	0.5	1.8	1.8	1.8
Release Time	Max.	ms	0.10	0.10	0.10	0.2	0.2	0.2	0.2	1.5	2.0	2.0	1.5	1.5	0.5	0.5	0.5
Resonant Frequency	Typ.	Hz	4200	2400	2400	900	900	900	900	-	-	-	-	-	-	-	-
Operating Frequency	Max.	Hz	300	200	200	100	100	100	100	250	250	250	100	100	-	-	-
Vibration (10-1000 Hz)		g	35	35	35	35	35	35	35	20	20	20	35	35	-	-	-
Shock (11 ms)		g	50	50	50	50	50	50	50	50	50	50	50	50	-	-	-
Capacitance	Typ.	pF	0.5	0.5	0.5	0.8	0.8	0.8	0.8	1.5	0.8	0.8	1.0	1.0	0.5	0.5	0.5
Operating Temp. Range	Deg.	°C	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-55 +125	-55 +125	-55 +125
Test Coil	Type		1700	1800	1800	1500	1500	1500	1500	1035	1035	1035	1500	1500	CP-12	CP-12	CP-12
Options / Features			• High Break-down Voltage • Custom Cut & Bend	• High Switching Current • Custom Cut & Bend	• High Switching Current • High Break-down Voltage • Custom Cut & Bend	• High Break-down Voltage • Custom Cut & Bend	• High Break-down Voltage • High Switching Voltage • Custom Cut & Bend	• Custom Cut & Bend	• General Purpose Switch • Custom Cut & Bend	• Economical Changeover Switch • Custom Cut & Bend	• High Power Changeover Switch • Custom Cut & Bend		• High Break-down Voltage • Custom Cut & Bend	• Custom Cut & Bend	• High Switching Current • High Breakdown Voltage • Vacuum Technology		