

Series  
SB  
SG  
TA  
TB

# Spark Gaps

**two electrode and  
triggered**

  
**Signalite**

1933 Heck Ave., Neptune, N. J. 07753 ■ Area Code 201-775-2490

DIVISION OF GENERAL INSTRUMENT CORPORATION

- DC Overvoltage Protection
- Electrical Energy Transfer
- Command Energy Switching
- Sub-Microsecond Response
- Rugged Construction

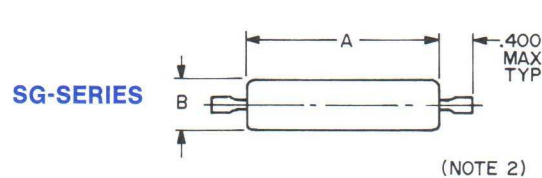
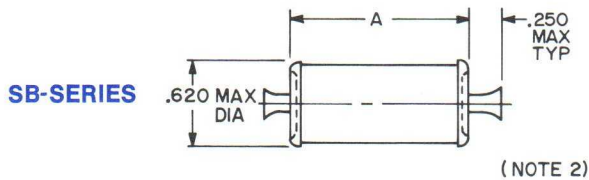
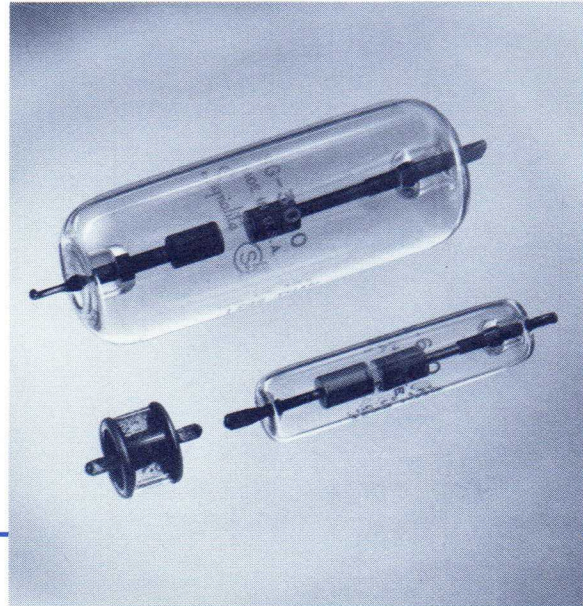
# Signalite

## two electrode spark gaps

- DC Overvoltage Protection
- Energy Transfer

The SB and SG-Series of two-electrode spark gaps excel as DC overvoltage protectors and for the efficient transfer of high-voltage, high-energy pulses. When used for protection against DC overvoltages, a quantitative prediction of whether or not non self-extinguishing, follow-on occurs cannot be made at the present time — it depends on the energy of the transient which originally caused the protector to trip, and also on the current capability of the power supply. All units have long-lived tungsten electrodes and rugged glass-to-metal seals.

The SB and SG-Series, 400 volt to 45 kilovolt is also available, on special order, with a ceramic envelope in the SC-Series. In cases where both SB and SG units are available in the same voltage, the SG will be found to give longer life.



SB-SERIES	
Voltage (kv)	Dim. A (Max.)
.40	0.486
.44	
.46	0.518
.50	
.52	0.618
.55	
.60	
.65	
.70	
.75	
.80	0.476
.90	
1.0	
1.1	
1.2	
1.3	
1.4	
1.6	
1.8	
2.0	
2.2	0.518
2.5	
2.75	
3.0	
3.5	
4.0	0.518
4.5	
5.0	
5.0	

SG-SERIES		
Voltage (kv)	Dim. A (Max.)	Dim. B (Max.)
2.0	2.200	0.591
2.5		
3.0		
3.5		
4.0		
5.0		
6.0		
8.0		
10.0		
12.0		
15.0	3.031	1.202
20.0		
22.5		
25.0		
27.5	3.312	1.202
30.0		
32.5		
35.0		
37.5	3.562	1.202
40.0		

### NOTES:

1. Normal tolerance on breakdown voltage is  $\pm 10$  percent.
2. End-Caps with the following dimensions also available instead of indicated terminations.  
A:  $0.360 \pm .005$  O.D. x  $0.406$  Nom.  
B:  $0.250 \pm .005$  O.D. x  $0.270$  Nom.
3. The part number is obtained by adding the desired breakdown voltage to the series type, e.g., SB-.75, SG-25.0, SC-40.0.
4. For voltages and terminations not indicated contact Signalite Applications Engineering for special services.

### TG-SERIES STILL AVAILABLE

The TG-Series of two-electrode and triggered spark gaps described in previous catalogs will continue to be available on a re-order basis.

- Command Energy Switching
- Sub-Microsecond Response Time
- Rugged Ceramic-Metal Construction
- Energy Rating 50-300 Joules

Trigger gaps are used for low-loss switching of high levels of stored energy with very short delay times. Operation is in the pulse mode, not DC, and the cautionary statement on follow-on current applies. Switching is accomplished by reducing the near-infinite resistance across the main electrodes which have a bias voltage to a near short by injecting an ionizing trigger pulse via a third electrode.

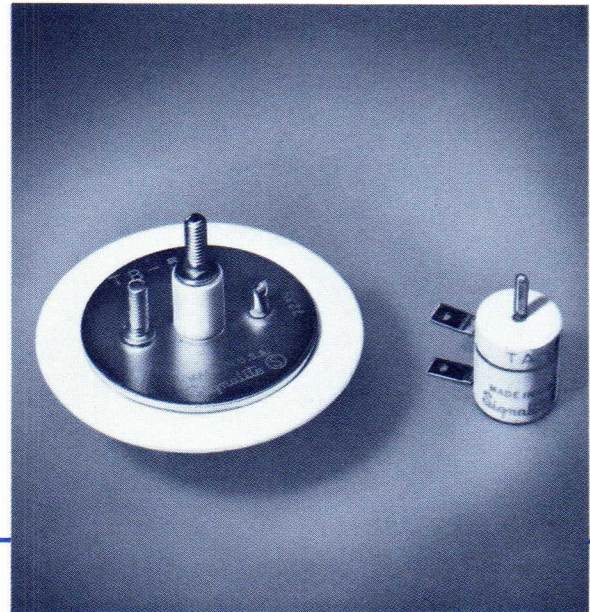
The delay time is the sum of the rise-time of the trigger pulse used to switch the gap on, and the response time of the gap itself. A 10 kv trigger is more than adequate for any listed unit, and Signalite pulse transformer PT-5311 is recommended when microsecond trigger rise times are required. If slower trigger rise times are permissible, an auto ignition coil is an economical trigger source.

The other portion of the total delay, the gap response time, is the elapsed time from trigger breakdown to main gap breakdown, and is intrinsic to the gap itself. This time must be added to the pulse rise-time to get the total delay. Reproducing response times require a minimum operating bias not less than 50 percent  $V_0$ , the self-breakdown voltage across the main electrodes (these electrodes are identified as "ADJ," and "OPP" in the accompanying figures). Sub-microsecond response requires a minimum of 80 percent  $V_0$ .

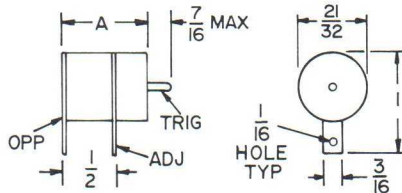
Whereas the minimum operating bias depends on the desired reproducibility and magnitude of the response time, the maximum permissible operating bias depends on the desired repetition rate and on the energy to be transferred across the main electrodes. As this energy increases, the deionization time required for restoring the open circuit state also increases. Thus, if the pulse rate is too fast, sufficient residual ionization will remain and the gap will spontaneously fire before the desired bias level is reached.

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## triggered spark gaps



TA-SERIES



TB-SERIES

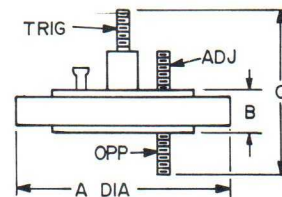


TABLE OF DIMENSIONS vs. SELF-BREAKDOWN VOLTAGE ( $V_0$ )

TA-SERIES		TB-SERIES			
$V_0$ (kv) (See Note)	Dim. A $\pm .0625$	$V_0$ (kv) (See Note)	Dim. A (Max.)	Dim. B (Max.)	Dim. C (Max.)
1.0-1.4	.75	2.5-4.9	1.99	0.23	2.03
1.5-7.4	.76	5.0-9.9	2.43	0.23	2.03
7.5-12.4	.79	10.0-19.9	2.69	0.54	2.10
12.5-15.0	.83	20.0-25.0	2.82	0.54	2.10

**NOTE**

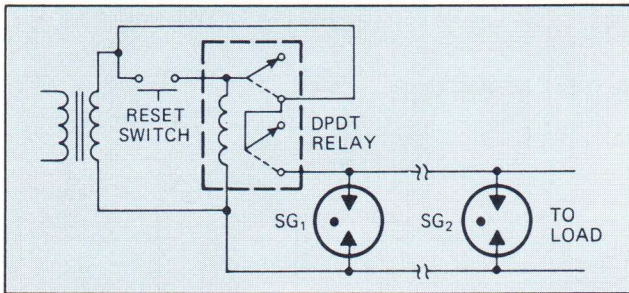
Any self-breakdown voltage,  $V_0$ , from 1.0-25.0 kv may be selected. The operating range for a given  $V_0$  is 50-80%  $V_0$ . Normal tolerance is  $\pm 10\%$ . The part number is obtained by adding the breakdown voltage to the series type (e.g., TB-11.0 is a TB-series unit with an 11.0 kv self-breakdown voltage, with an operating range of 5.5-8.8 kv).

ENVIRONMENTAL TESTING

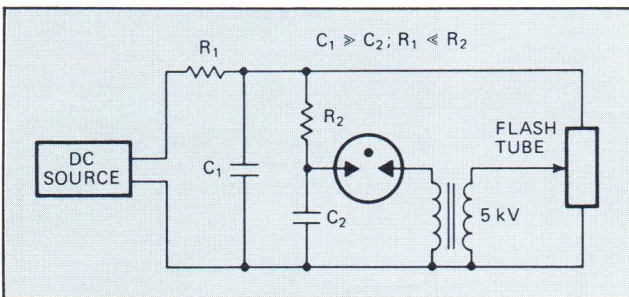
All units meet the requirements of MIL-STD 202 as outlined below.

Test	Method	Condition
Vibration	204	C
Shock	213A	A except 100 G's
	213A	C
	213A	C except 1 ms.
Humidity	103	B
Temperature Cycling	102A	C
Barometric Pressure	105C	B
Thermal Shock	107	B

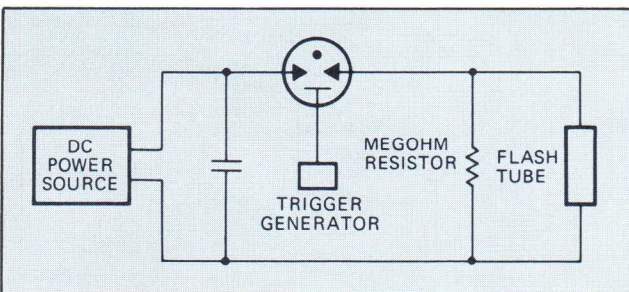
# spark gap applications...



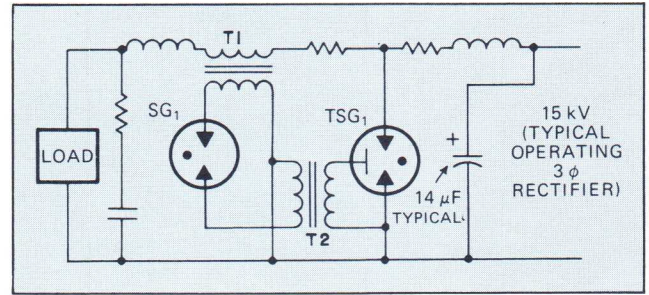
**1. Load protection circuit** is first reset, energizing relay and connecting load to supply; relay is held energized via its own contact. If transient occurs, SG<sub>1</sub> fires, and its voltage drops below voltage needed to hold relay, opening contacts and disconnecting load. Second spark gap is used if load is connected through long length of line, susceptible to transient pick-up.



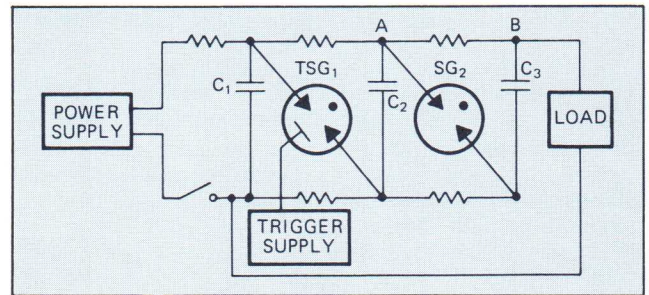
**2. Two-terminal spark gap** repetitively triggers flash tube when C<sub>2</sub> charges to the gap's breakdown voltage. Capacitor C<sub>1</sub> then releases its charge through the flash tube.



**3. Three-terminal triggered spark gap** fires flash tube when pulsed. Megohm resistor provides path for trigger pulse and also for initial rush of current through spark gap.



**4. Crowbar protection** against overcurrent surges is provided by SG<sub>1</sub> set to trigger from the secondary of the series transformer, T<sub>1</sub> and TSG<sub>1</sub> which absorbs overcurrent when triggered.



**5. High voltage Marx generator** uses triggered spark gap and two-terminal spark gap to place three capacitors in series providing high-voltage pulse to load.

## SPECIAL SERVICES

- Life-testing under customers' particular circuit conditions.
- Special packaging such as terminal modifications and potting.
- Manufacture of close tolerance devices.
- Development of special purpose devices.

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