



**ZEONICS SYSTECH**  
DEFENCE & AEROSPACE ENGINEERS (P) LTD.



# High Voltage Rail Gap Switches



Whenever there is a pulse power requirement and current requirements are in hundreds of kilo amps or mega amps, a rail gap is the right choice as it offers multi-spark, multi-channel discharge by which the inductance is further lowered and it is as good as connecting many spark gaps firing in parallel.

**Proudly Made in INDIA**



A typical rail gap switch is a switch which operates under high gas pressure and can have a transient time with discharge & rise time in the region of nano seconds with jitter in a few nanoseconds, pulse currents in the region of 700 to 1000 kA and voltages in the region of 20kV to 100kV, these are essentially used for studies of Z pinch plasmas, fusion, magnetisation, and similar different type of EMP or nuclear activities.

### Applications

High voltage rail gap switches, similar to spark gaps, are basically used for switching of large currents and concentration of energy as well as power wherever required. The applications of rail gap are limited to very large power transfer and hence used by very specific customers who are looking out for focusing energy into a specific area for fusion research or plasma focus and similar applications where fusion energy has to be generated, generation of neutrons, electron accumulation.

Rail Gaps we make are known for minimum erosion, large power transfer possible, veryfast rise time of energy which can be dumped into a load, sudden magnetisation by using this, and also used for high energy pulsed beams where transmutation of metal can be done.

### Advantages

They are low cost, safe, very reliable compared to their other counterparts, robust in application and require minimum maintenance. They are also not prone to other fields and can work in strong radioactive atmosphere once they are designed for the same.

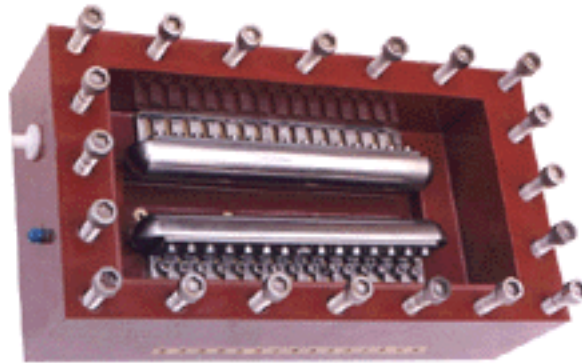


### High Voltage Optically Fired Rail Gap

1. Input : 60kV D.C. to 100kV D.C
2. I Peak :  $\approx$  500kA to 1000kA (1.0 Million Amp)
3. Pulse Width : Microseconds
4. Application : Z Pinch Plasmas
5. Dimensions : 800mm x 300mm x 180mm
6. Trigger : optically triggered laser or H.E.U.V. Lamp
7. Trigger Power : 10 watt laser (Or) 2.5kJ Flash Lamp
8. Type No : Z/13/120

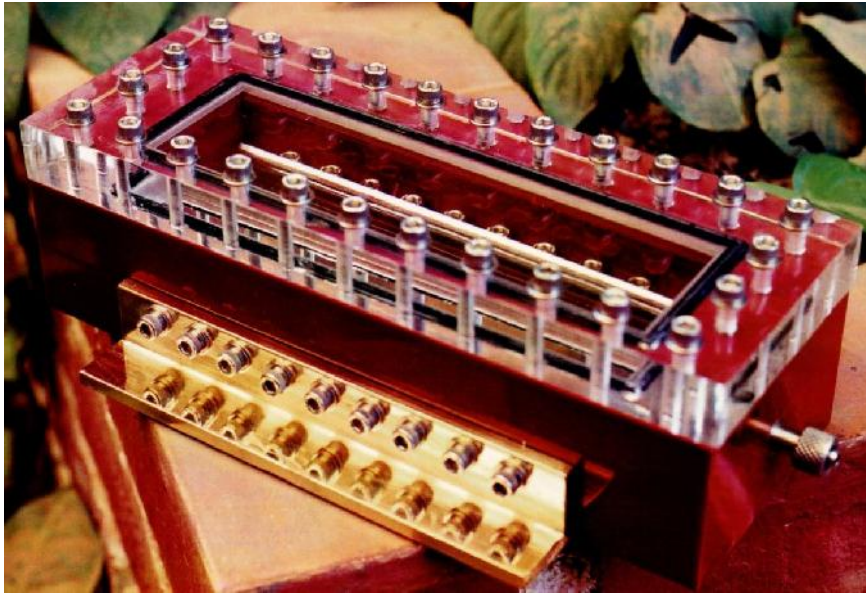
## Rail Gaps

There has been an increased requirement for Pulse Power facilities coming up all over the World and as the demands are becoming more, it is learnt that, larger power requirements were there in demand for more Experiments. Since larger Pulse Power cannot be handled by regular Spark Gaps there has been a requirement of Linear or Coaxial Spark Gaps. These Spark Gaps are called Linear Rail Gap Switches or Coaxial Rail Gap Switches. Both these switches are manufactured by us and here are some technical details.



TYPES OF RAIL GAP SWITCHES MANUFACTURED					
BY ZEONICS SYSTECH BOTH ISOTOPE & NON ISOTOPE BASED					
Model	Selfbreakdown Voltage In KVDC	Max. Peak Current	Electrode Length	Gas	Electrode Diameter
ZE/RG/101/AM	20 to 120	750 KA	305 m.m	N <sub>2</sub>	50 mm
ZE/RG/102/AM /ZI MOD-4	20 to 120	1 MA	305 m.m.	N <sub>2</sub>	50 mm
ZE/RG/MOD-3	20 to 70	750 KA	305 m.m	N <sub>2</sub>	35 mm
ZE/RG/MOD-2	20 to 50	500KA	305 m.m	N <sub>2</sub>	25 mm
ZE/RG/600/AM MOD - 5	10 to 40	1 MA	600 m.m	N <sub>2</sub>	12 mm
ZE/RG/600/AM MOD-5/AM MIGHTY/ZAR	10 to 40	2.5 MA	600 m.m	N <sub>2</sub>	15 mm
ZE/RG/ZEUS MOD- 4/VARIANT	20 to 120	5 MA	600 m.m.	N <sub>2</sub>	50 mm
ZE/RG/ PHANTOM	30 to 120	2.5 MA	450 m.m	N <sub>2</sub>	50 mm
ZE/RG/AM RAIL GUN MOBILE	10 to 40	500 KA	305 m.m.	N <sub>2</sub>	25 mm
ZE/RG/AM ZAR/FUSION	20 to 50	750 KA	305 mm	N <sub>2</sub>	50mm

[Kindly contact us for specific requirement](#)



### Rail Gap Switch

1. Working voltage : 25kV
2. I peak : 200kA to 300kA
3. Inductance :  $\leq 10\text{nH}$
4. Total Charge : 4 Coulombs
5. Type No : ZHS/AMJI/004

### Installation

Rail Gaps have specific requirements where a rail gap has to be part of circuit. You cannot have a rail gap and draw wire from there into your load. Rail gaps always have to be fixed in a series of a strip line. The strip line configuration can be made out of copper plates or aluminium plates as per the current desired and rail gap load lines are cut and the rail gap is installed inside for carrying the high currents by which the minimum inductance is there as well as the entire energy is not lost into  $I^2R$  losses.

Special installations in Rail Gaps can be under high pressure gas or even under oil.

### Testing

Rail Gaps are tested for its peak current in-house where we have got the facility where we can go to 500 kA of current and test the rail gaps. We have BDV & pressure test also.

### **Contact:**

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