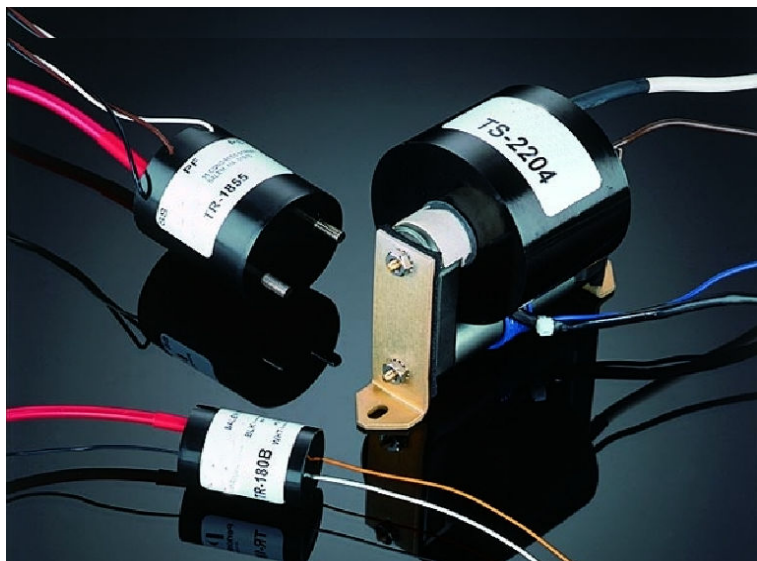


# Trigger Transformers and Chokes



## Description

Excelitas has been manufacturing high voltage transformers since 1956.

Standard and custom designs are available with a wide range of input and output voltages. High performance is ensured through state-of-the-art manufacturing techniques including vacuum impregnation, vacuum encapsulations, and meter-mix and dispense systems.

## Features

- Peak output voltage up to 40kV
- Load current up to 80A RMS
- Surface mount, through hole or hardware mounted
- Flexible design—easily modified

## External Trigger Transformers

Type	Peak Output Voltage (kV)*	Primary Discharge Capacitor (ufd)	MAX Input DC Source (Volts)	Peak Primary Current (A)**	Rise Time 10%-90% (µs)**	Pulse Width 50% Amplitude (µs)**	Turns Ratio	Hold-off Voltage		Length (inches)	Width (inches)	Height (inches)	Diameter (inches)
								Sec to Pri (kVdc)	Sec to Pri				
TR-2298***	5.0												
	6.0	0.1	150	50	0.1	0.35	21:1	4.0	0.35	0.41	0.34	—	
TR-36A	7.0	1.0	250	25	1.0	5.0	15:1	0.5	—	—	0.69	1.06	
TR-2300***	10.0	0.1	200	80	0.15	0.35	21:1	4.0	0.35	0.41	0.35	—	
TR-1647	12.0	2.0	40	40	1.5	1.2	250:1	1.0	—	—	1.00	1.25	
TR-2289	12.0	0.5	160	90	0.8	1.0	58:1	4.0	—	—	0.78	1.03	
TR-148A	12.0	0.5	400	120	0.35	0.5	30:1	2.0	—	—	1.93	1.25	
TR-2080	15.0	0.5	150	60	0.5	1.0	65:1	2.0	—	—	1.00	0.94	
TR-1749C	18.0	0.5	250	120	0.7	0.7	80:1	0	—	—	1.25	.625	
TR-2081	20.0	1.0	200	140	1.0	2.5	155:1	5.0	—	—	1.75	1.25	
TR-132C	20.0	0.5	400	60	2.25	2.5	70:1	0	—	—	1.06	1.75	
TR-180B	20.0	1.0	200	110	1.0	1.5	112:1	5.0	—	—	1.50	1.00	
TR-2070	25.0	0.5	240	76	1.5	1.2	220:1	0	—	—	1.50	0.75	
TR-2157	25.0	0.5	350	60	1.2	1.5	73:1	5.0	—	—	2.25	1.25	
TR-2012	28.0	0.5	300	90	2.0	5.0	163:1	1.5	—	—	2.06	1.75	
TR-1700	35.0	0.5	400	70	0.75	1.5	70:1	20.0	3.63	2.13	2.00	—	
TR-1795	40.0	0.22	600	96	0.5	0.5	51:1	15.0	3.06	3.63	7.00	—	
TR-1855		2.0	300	90	5.0	5.0	121:1	5.0	—	—	2.06	1.75	

\*Open circuit, unloaded secondary.

\*\*Measured at maximum voltage input, with primary discharge capacitor listed.

\*\*\*Surface mount.

## Series Trigger Transformers

Type	Peak Output Voltage (kV)*	Rise Time 10%-90% (µs)**	Pulse Width 50% Amplitude (µs)**	MAX Input DC Source (Volts)	Peak Primary Current (A)**	Turns Ratio Secondary to Primary	Hold-off Voltage		Saturated Inductance µH sat	Winding Resistance ohms	MAX Current RMS (A)	Length (inches)	Width (inches)	Height (inches)
							Secondary (kVdc)	to Primary						
TS-2174	10	0.4	0.3	400	60	38:1	2	80	1.0	0.4	1.2	1.0	0.8	
TS-1987	10	0.5	0.3	600	215	19:1	5	70	0.5	0.1	—	1.0	1.3	
TS-1952	10	0.6	0.2	400	300	40:1	5	36	0.1	1	—	1.5	1.0	
TS-2028	13	0.5	0.5	500	120	40:1	5	35	0.03	16	2.4	2.3	1.9	
TS-179	15	0.4	0.7	800	100	25:1	5	80	0.05	12	2.8	2.1	2.5	
TS-2295	18	0.8	1.0	500	170	29:1	20	350	0.22	18	3.5	2.8	3.56	
TS-170	20	0.2	0.5	2000	150	10:1	5	18	0.05	20	2.8	2.3	2.5	
TS-146B	22	0.5	1.3	1000	850	30:1	30	73	0.015	35	4.0	3.5	6.0	
TS-146A	27	0.5	0.5	1500	660	30:1	30	110	0.033	25	4.0	3.5	6.5	
TS-185	30	0.5	1.0	600	60	50:1	15	550	0.3	15	3.3	2.8	3.8	
TS-136B	40	0.65	2.15	1500	1100	30:1	30	110	0.02	80	7.5	5.0	5.75	

\*Open circuit, unloaded secondary.

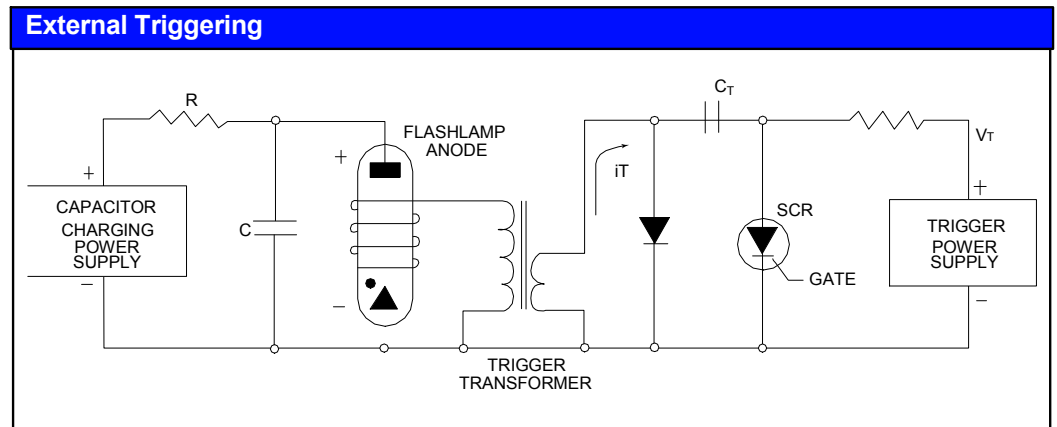
\*\*Measured at maximum voltage input, with primary discharge capacitor listed.

## Chokes

Type	Inductance	DC Resistance (ohms)	Voltage (kV)	MAX Peak		Length (inches)	Width (inches)	Height (inches)
				Current 1 ms Pulse (amp)	RMS Current (amp)			
TC-2136	50	0.03	5	2000	25	2.6	3.5	4.3
TC-1848	200	0.12	5	300	8	—	2.4	1.8
TC-70	300	0.19	5	2000	8	3.5	2.6	4.75
TC-71	600	0.25	5	2000	8	3.8	2.6	4.75
TC-198	775	0.27	2.5	1000	4	4.0	2.6	4.75

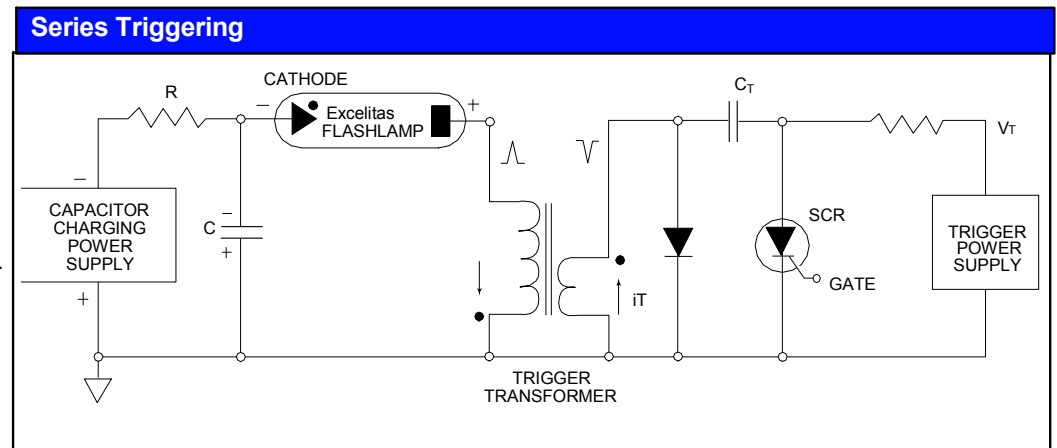
## External Triggering

External triggering uses a high voltage trigger pulse to create a thin ionized streamer between the anode and cathode within the lamp. The coupling of this voltage to the lamp may be accomplished using a thin nickel wire wrapped around the surface of the lamp envelope as shown. Other techniques used to couple external trigger transformers are reviewed in the technical paper “Design Considerations for Triggering of Flashlamps”.



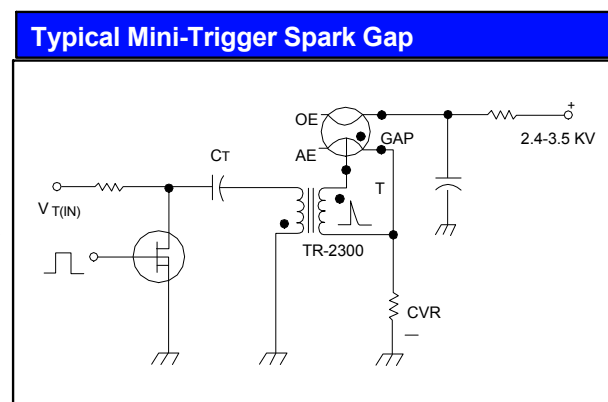
## Series Injection Triggering

Series injection triggering differs from external triggering in that the discharge current from the energy storage capacitor passes through the secondary winding of the trigger transformer. The secondary winding of the transformer must therefore be designed to carry the total current of the discharge. This type of trigger transformer is consequently larger, heavier and more expensive than the external trigger transformer.



The inductance of the secondary winding (of the trigger transformer) is part of the discharge circuit and may be utilized to control the energy storage capacitor's current pulse wave shape. A typical series injection circuit is shown.

Additional series injection trigger circuit configurations are discussed in the technical paper “Design Considerations for Triggering of Flashlamps”.



### Outline Drawings or Specification Charts

$E = \frac{1}{2} CV^2$	where: $E$ = Discharge energy (joules)
	$C$ = Capacitance (microfarads)
	$V$ = Discharge voltage (kilovolts)
$PAVG = E F$	$PAVG$ = Average power (watts)
	$E$ = Discharge energy (joules)
	$F$ = Flash rate (pulses per second)
$IPK = V(C/L)^{1/2}$	$IPK$ = Peak discharge current (keep below 1000 amps)
	$L$ = Circuit inductance (use $0.5\mu H$ for best approximation)
$t_{1/3} = \pi (LC)^{1/2}$	$t_{1/3}$ = Pulse width at 1/3 peak.

**Note:** Peak currents should be kept below 1000 amps. Exceeding this limit could cause envelope fracture, excessive electrode wear and premature darkening.

### Caution

Some glass flashlamps are under high internal pressure, and, if broken, could result in glass particles being blown into the face and hand areas. To prevent injury, wear suitable protective devices such as safety glasses and/or face mask and gloves.

Some types of pulsed lamps generate intense ultraviolet radiation which, if not properly shielded from personnel in the area, will cause burns to any exposed skin and especially to the eyes. Do not expose any skin area or the eyes to the direct or reflected radiation of an operating lamp. If you have to view an operating lamp, always use protective covering for exposed skin area and ultraviolet-attenuating goggles for the eyes.

For more information email us at [generalinquiries@excelitas.com](mailto:generalinquiries@excelitas.com) or visit our web site at [www.excelitas.com](http://www.excelitas.com)

Note: All specifications subject to change without notice.

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