

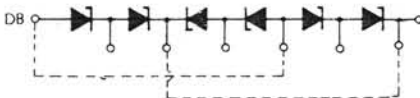
Selenium Transient Voltage Suppressors

Circuit arrangement and choice of L-Sel

Any arrangement of suppressors can be made, but the most common are shown in figure 1. Examples of how these are applied are given in figure 2. The most effective position for the **L-Sel** is directly across the semiconductor to be protected but simpler arrangements can often be used, at any rate with configurations containing only diodes. It is preferable to use individual **L-Sels** in thyristor circuits, since the forward characteristics of thyristors may block conducting paths which would otherwise simplify the suppression arrangements.

Apart from the various circuit configurations, **L-Sels** fall into two groups — polarised and non-polarised. Polarised types may be used only where the voltage across them does not reverse, whereas non-polarised types must be used for alternating voltages or when there is a chance of the voltage reversing for other reasons (for example, if used across the armature of a reversible motor). Thyristors nearly always require a non-polarised **L-Sel**. An exception to this occurs when a diode is connected across a thyristor, as in the case with a 3-phase half-controlled a.c. regulator.

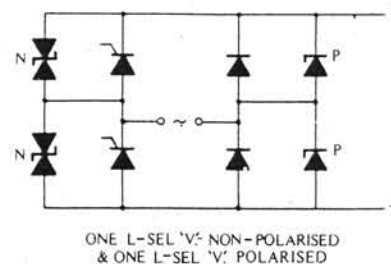
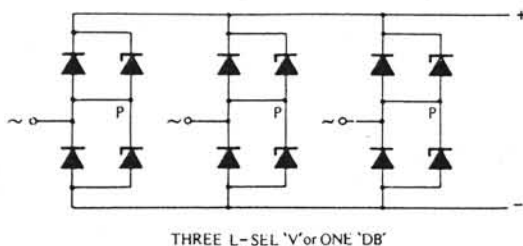
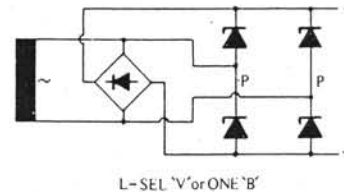
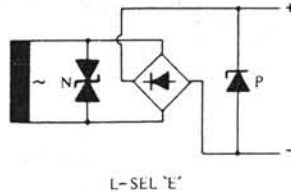
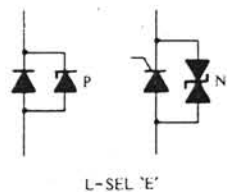
Figure 1. Standard L-Sel Arrangements



- E. Polarised for connection across d.c. or diodes; Non-polarised for a.c. circuits and thyristors.
- V. Used in pairs for single-phase bridges or in triples for three-phase bridges.
- B. Full protection for single-phase bridges.
- DB. Full protection for three-phase bridges.
- V, B and DB available also with non-polarised arms for use with thyristor bridges.

Figure 2.

Examples of protection using L-Sels.



Selenium Transient Voltage Suppressors

Specifying the L-Sel

Having decided upon the circuit configuration, the voltage and current ratings have to be determined.

The circuit rating of an L-Sel plate is 20V in d.c. circuits, and 25V r.m.s. in a.c. circuits. Note that in a.c. circuits only non-polarised arrangements are used, so the a.c. voltage is never applied directly to a single plate, which would otherwise conduct in the forward direction. However, if an L-Sel is connected directly across a diode in a normal rectifier arrangement it may be rated according to the a.c. voltage in the circuit, although it is polarised, since the diode carries the forward current. The number of plates to be connected in series in each arm of the L-Sel is found by dividing the circuit voltage by 25 or 20, as appropriate, and rounding-up to the next whole number.

The choice of plate size depends on the peak surge current it may have to carry and upon the voltage drop at that current. The voltage/current characteristics are shown in figure 3 and the maximum current ratings are given in figure 4 and table 1. The choice is straightforward, therefore, when the prospective peak current is known. If the current is not known, it should be assumed that the peak value of the current normally flowing in the circuit may be diverted into the L-Sel,

which should be chosen for plate size accordingly. When considering surges arising from supply transformer magnetising current it should be borne in mind that the peak value can rise to 2.4 times its normal r.m.s. value after switch-on. If L-Sels are connected across the secondary windings, this value must be multiplied by the transformer primary/secondary ratio. If the transformer magnetising current is not known, it may be measured, or if this is not possible, a plate size may be chosen from figures 5 or 6 which are based on typical transformers.

Table 1. Current ratings of L-Sel plates.

Plate Type	Size mm	Rated Peak Current		
		Repetitive		Non-repetitive
		Non-polarised	Polarised	
A	100 × 100	210	125	640
B	50 × 100	100	60	300
C	50 × 50	50	30	150
D	33 × 33	20	12	60
E	25 × 25	10	6	30
F	20 × 20	5	3	15

Figure 3. Voltage/current characteristics of L-Sel plates.

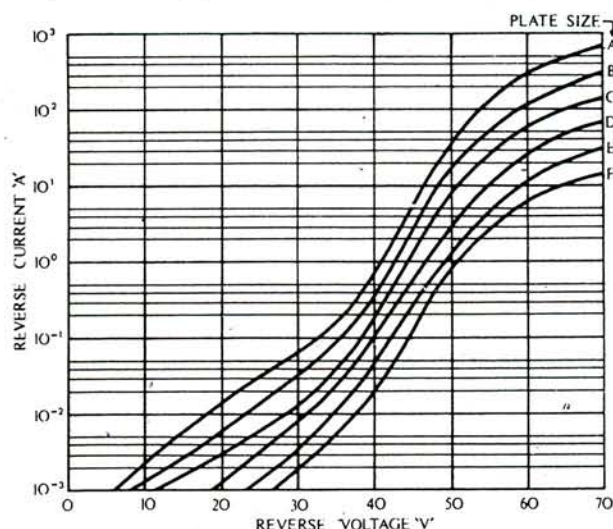
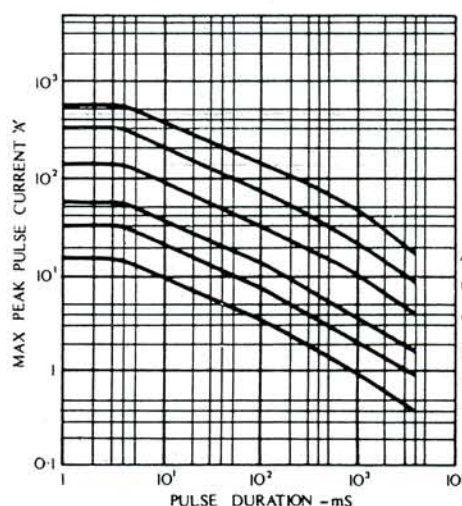


Figure 4. Peak current/time ratings of L-Sel plates.



Voltage Ratings of Semiconductors

After the appropriate selection of L-Sel has been made from circuit data, the maximum voltage drop across the L-Sel under surge conditions must be determined, using figure 3 and knowing the maximum possible peak current and number of plates in series. The voltage rating

of the semiconductor to be protected must be higher than the voltage drop across the L-Sel under the worst surge condition. Note that under fault conditions the surge current may be much higher than normal.

Coding

L-Sels are coded as shown in the following example.

LS 275 P 60 E D

plate size—see table 1

L-Sel configuration—see figure 1

Non repetitive peak current rating—see table 1

P=polarised N=non-polarised

Voltage reference=25 times number of plates in each arm (all circuits)

Symbol for L-Sel transient suppressors.

Selenium Transient Voltage Suppressors

Figure 5. L-Sel plate ratings with single-phase transformers.

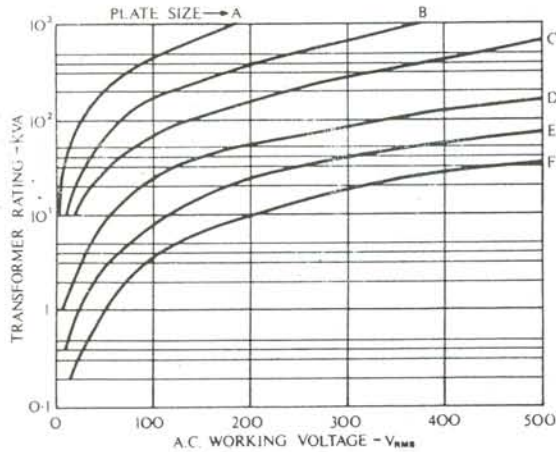
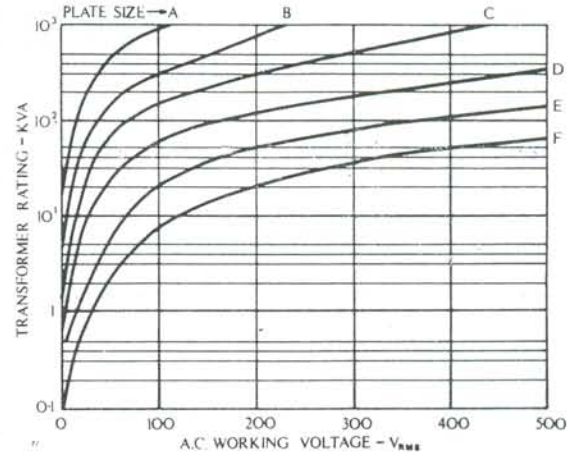


Figure 6. L-Sel plate ratings with three-phase transformers.



Dimensions

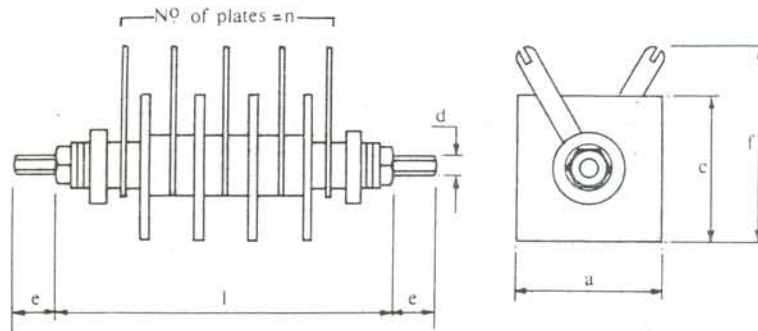


Table 2. Dimensions of L-Sel assemblies.

Plate size	a	c	d	e	f	Max. no. of plates	Plate pitch, p.	Assembly allowance, q.
A	100	100	M8	16	135	72	6	30
B	100	50	M5	16	68	72	6	30
C	50	50	M5	10	68	72	3	23
D	33	33	M5	8	48	72	2	23
E	25	25	M4	8	39	51	2	23

All Dimensions in millimetres.

Fixing centres, l , = $q + np$, where n = total no. of plates.

Standard build is single end fixing - 4 plates or less, double end fixing 5 plates or more.

Exceptions to these are built to special order

IMPORTANT

Plates Sizes D 33 x 33 and F 20 x 20 are only available for quantity orders for O.E.M Requirements.

Delivery for requirements on all other Plate sizes can be produced at short notice for any circuit configuration.

The policy of the Company is one of continuous improvement and we reserve the right to change specifications without notice.