

The Correct Application of Surge Protective Device

In order to protect equipment from damage caused by transients on the AC power, Surge Protective Device (SDP) are commonly installed next to the equipment. Though it is convenient but it could also be very costly as very power point will require one unit. More importantly this arrangement may cause problem in Malaysia, Singapore, Brunei, Hong Kong and many other countries where the regulation requires Earth Leakage Circuit Breakers (ELCB) to be installed. Figure 1 is an illustration of the installation mentioned.

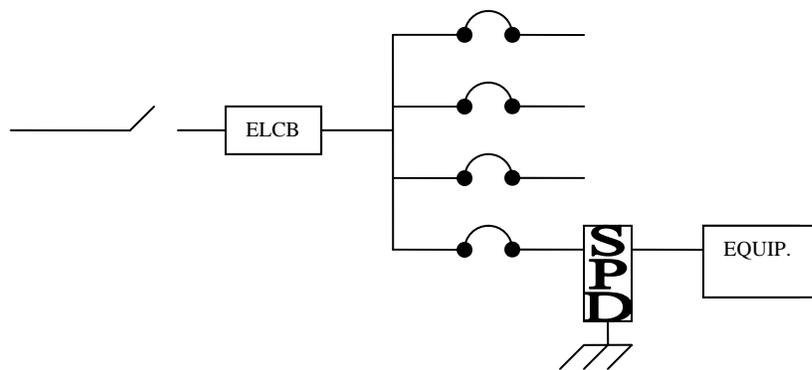


Figure 1

In Figure 1, the SPD is a series type. No matter the SPD is a series type or a parallel type, it will still cause nuisance tripping.

As we know, surge or transient is generally an over voltage impulse super impose to the supply voltage while the function of the SPD is to clamp and bypass the over voltage to earth. This bypass will cause current to flow from line or neutral to earth. On the other hand, the function of an ELCB is to trip the power when there is any current flow from line or neutral to earth. Hence whenever the SPD functions, the ELCB will also trip causing frequent power interruption.

Therefore the following options will be essential in overcoming the above situation:

1. Replace the ELCB with Earth Leakage Relay (ELR) with 0.1 second time delay which is quite costly.
2. Rewire the circuit that powers the protected equipment as illustrated in Figure 2. Sometimes it will be quite difficult especially when the cable has been concealed.

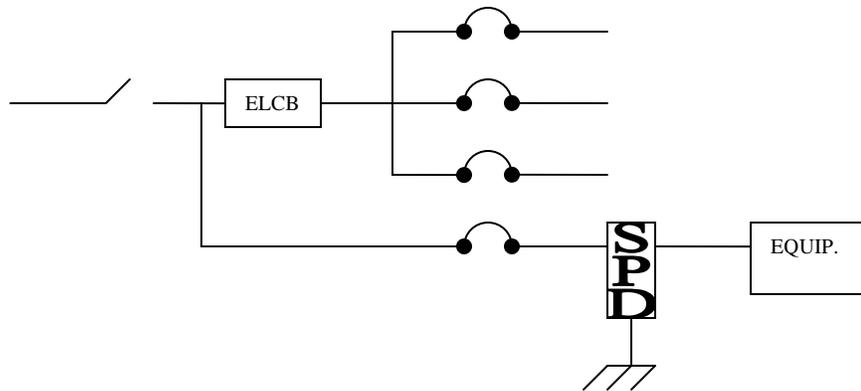


Figure 2

3. Relocate the SPD to the position before the ELCB of the Distribution Board (DB) as illustrated in Figure 3. However the rating of the SPD has to be in accordance to the panel current consumption. In this arrangement, when there is an electrical surge, the SPD will divert the surge current to ground before it reaches the ELCB. Therefore the ELCB will no longer trip. On the other hand, because the surge current is removed from the very beginning, it will not affect the entire power system. This arrangement will protect all equipment that is powered by the same DB. For commercial and industrial power system a multi-stage protection is recommended.

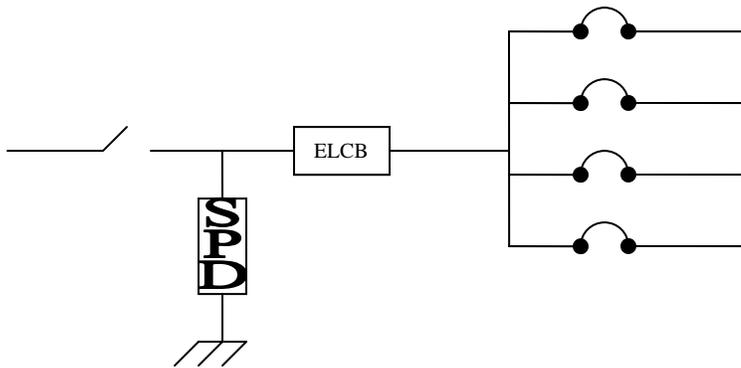


Figure 3

For optimal performance SPD should be added when the system and equipment is new. Most equipment and cable can recover automatically after electrical surge when they are new. However after several experiences of electrical surges, the insulation breakdown voltage gradually decreases due to the carbonization process caused by electrical surge. Finally even when there is no thunderstorm and in normal operation voltage, there will be leaking and the ELCB will trip. At this stage, adding SPD as in Figure 3 can only reduce the tripping but will not

eliminate the tripping problem. An insulation test of the cabling system and individual appliance will be required to identify and then replace the affected cable or appliance. This can be very time consuming and costly.

Prepared by,
MAK MING HUNG
Chartered Electrical Engineer, UK,
Registered Professional Electrical Engineer, Australia,
Member of IEE, IEAust, HKIE

LIGHTNING PROTECTION SYSTEM SDN BHD • *Add:* No. 42-4, Jalan 11/116B,
Kuchai Entrepreneurs' Park, 58200 Kuala Lumpur, MALAYSIA • *Tel:* 603-7980 5911 •
Fax: 603-7980 4862 • *Website:* www.lpsystem.com • *Email:* info@lpsystem.com