



WHITE PAPER

LSA / LSA-PLUS LIGHTNING & SURGE PROTECTION



INTRODUCTION

An area of lightning protection that is often poorly implemented, is the protection of telecommunications wiring. Insufficient protection of these services can often result in damage to expensive equipment and more importantly the loss of critical communications. Even with the advent of VOIP technologies and the use of optic fiber in many communications applications, copper is still a preferred medium in some new and existing facilities.

This white paper will provide an outline to designers and specifiers on the basis behind the selection and application of surge protection technology in LSA / LSA-PLUS applications.

LSA / LSA-PLUS INSTALLED BASE

The LSA / LSA-PLUS systems are designed to provide a very high-density wiring management solution for telecommunications systems. It is commonly found at large sites to manage many hundreds if not thousands of telephone lines within a private telephone exchange system (PBX / PABX). They are also used in extremely large process control systems to manage a large number of I/O wiring.

With this in mind, the typical LSA / LSA-PLUS system runs at 180VDC for telephones but can also operate at lower industrial control voltages such as 24VDC or 48VDC.



FINE VS COARSE PROTECTION

Just like in power systems, the coordination of protection devices is paramount and requires a careful study of the protection characteristics offered by the surge protection device. Unfortunately, this type of information is often not clearly provided by manufacturers due to the difficulty in obtaining coordination information. Coordination data to IEC 61643-22 can only be obtained through type testing of sample devices in the laboratory.

Some manufacturers do provide an easy to use selection guide with coordination information built-in such as the following:

| Characteristic | Symbol | Description |
|--|--------|---|
| Energy coordination (with another Yellow/Line arrester) | + | Arrester has a decoupling impedance and is suitable for coordination with an arrester marked with ☐ |
| | ☐ | Arrester is suitable for coordination with an arrester with decoupling impedance + |

Figure 1 - Energy Coordination Symbols - DEHN & SOHNE

Coarse protection should be rated and tested to 10/350µs waveform or Category D1 acc. IEC 61643-21. It is analogous to the Type 1 rating seen in IEC61643-11 LV power arrestors.

Fine protection should be rated and tested to 8/20µs waveform or Category C2 and C1 acc. IEC 61643-21. It is analogous to the Type 2 & Type 3 ratings respectively seen in IEC 61643-11 LV power arrestors.



Ideally, the manufacturer should also provide protection ratings for the system when installed as a whole; i.e. the rating when both the fine and coarse protection are installed together. This “combined” rating is typically the best of both worlds and guarantees coordination between the coarse and fine protection elements.

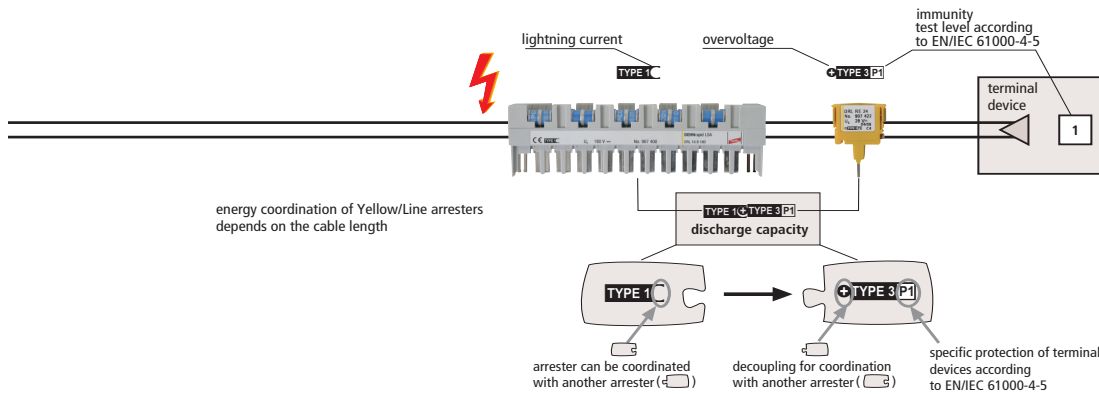


Figure 2 - Protection scheme with coordination - DEHN & SOHNE

OTHER PROTECTION CONSIDERATIONS

Another consideration is the relatively low dielectric withstand of telecommunications equipment compared to typical power equipment. Due to this lower threshold, it becomes even more important to employ better protection systems for the purposes of overvoltage protection. Protection to a minimum of Class 1 as per IEC 61000-4-5 is recommended for general protection purposes.

Frequency response of the surge protection device is another important element that needs to be looked at before selection is finalized. The same systems used for voice are often used for data transmission purposes as well e.g. ADSL, ADSL2+, SDSL, etc. It is of paramount importance that you select a product that does not limit the bandwidth and transmission characteristics of the data communications being used on that line. For example: ADSL 2+ is typically 1.1 to 2.2MHz and other newer protocols can be much higher. Selection should be based on manufacturer's recommendations and with a healthy buffer between the operating frequency and the cut-off frequency to ensure that there is interference.

SERVICEABILITY

The serviceability of telecommunications surge protection devices are often overlooked and can be quite frustrating for the technician asked to fault find or troubleshoot an installation years after commissioning. Telecommunications wiring pairs can easily number in the thousands for a large site and serviceability should be a high priority at the design stage.

The first part of serviceability is the ease of fault finding; ideally some form of visual indication of failure is available on the surge protection device. The second part is ease of testing and replacement of individual elements, the ability to remove each protection component and test using readily available testing equipment can save a lot of frustration and time. This modularity also allows the replacement of the individual protection components; reducing service cost and maximizing uptime of the unaffected lines.

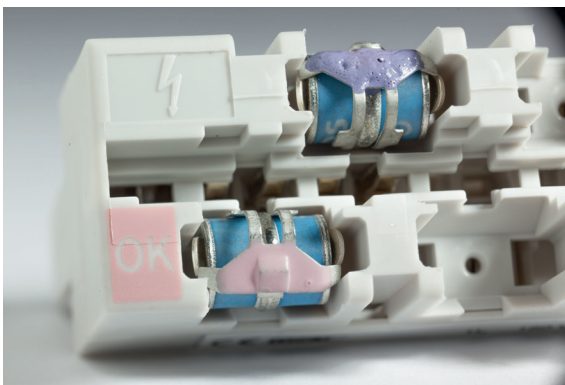


Figure 3 - Visual indication of failed SPD - DEHN & SOHNE



Figure 4 - Total modularity of installation - DEHN & SOHNE

SUMMARY

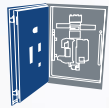
Lightning and surge protection of LSA / LSA-PLUS wiring systems should be considered and easily implemented during design and specification. Primary selection criteria should be based on risk of overvoltage events, coordination of coarse and fine protection components, Class 1 immunity protection and serviceability to prolong service life and reduce whole-life cost of the system.

EXPERIENCE BETTER

Over 10,000 customers trust us to deliver their solutions



End to End Service Capabilities



Custom DB Manufacturing Facility



National Customer Support



Dedicated Training Facility



National Customer Support Centre

43 Newton Rd, Wetherill Park NSW 2164

Tel: 1300 556 601 Fax: 1300 550 187

Email: customerservice@ipd.com.au

www.ipd.com.au

