

## A simple guide to selection of Lightning and Surge Protection

Please note that this is a very simple summary and must be read in conjunction with the relevant code **SANS 10142-1:2008 Edition 1.6 Annex L** which refers specifically to surge arresters.

At present it **is not** compulsory to install lightning and overvoltage protection but should you install surge arresters then it must be done in accordance with SANS 10142-1:2008 Annex L.

For more summarised information please check our website [www.surgetek.co.za](http://www.surgetek.co.za) sub section SABS Codes.

The selection of surge arresters has become very confusing for the layman and gets even worse when trying to ensure that you select the correct surge and lightning protection for the application.

To make it easy here is a simple selection guide.

There are 3 x main categories of lightning surge arresters.

**Class 1** – (10/350) lightning current arresters, which can withstand direct lightning (must be used with Class 2)

**Class 2** – (8/20) surge arresters, to protect against induced surge currents

**Class 3** - (8/20) surge arresters, to protect against induced surge currents

### 1.0 **Lightning Current Arresters – Class 1 (10/350)**

Typical surge handling ability must be 12.5kA (10/350) per phase.

Whenever a building has external lightning protection such as a mast, or conductors on the building, Class 1 lightning current arresters are required.

**DEHNbloc M** (Phase), **DEHNgap M** (Neutral)

These units are designed to withstand direct lightning surge currents and are very robust devices, but on their own cannot clamp the voltage to low enough levels to protect sensitive electronics. Thus Class 1 lightning current arresters **must always be used in conjunction with** Class 2 surge arresters (8/20).

Should you use **DEHNbloc M** then there is no need for decoupling between Class 1 and Class 2 arresters. (This is not true for all other makes of surge arresters).

If you do not use a Class 2 surge arrester in conjunction with the Class 1 lightning current arresters, surge up to 3kV could enter the system and the surge arresters would not operate thus damaging sensitive electronics.



## 2.0 **Surge Arresters – Class 2 (8/20)**

### **DEHNguard® 275**

In **all cases** you must install a minimum of a **Class 2** surge arrester in the main electrical distribution board.

The SANS 10142-1:2008 requires that these surge arresters must withstand a nominal surge current of 5kA and a peak surge current of 10kA. Experience has shown this to be inadequate.

The IEC requires a nominal surge current rating of 10kA and 25kA peak surge current.

All surge arresters (except for gapped type) must have a disconnection mechanism with a visual indication showing end of life, this can be mechanical flag or a light.

## 3.0 **Combination Arresters – Class 1 & 2**

### 3.1 **DEHNventil® TT (25/100 kA) (10/350)**

To overcome the problem of co-ordination of Class 1 and Class 2 arresters we have developed a combined surge arrester which eliminates this problem. The **DEHNventil® M TT** makes use of pre-triggering technology which is a combination Class 1 and Class 2 arrester in 1 x packaging. The main advantage of this unit is that it can be used in all applications and offers complete protection and co-ordination with Class 3 arresters that may be installed within the equipment. In addition it has **pluggable** modules that can be replaced without the need to disconnect the power.

A further advantage of this combination is that it halves the clamping voltage Phase to Neutral when compared to the standard method of installing surge arresters from each Phase and Neutral to Earth and it can be used on all types of wiring applications, TNS, TN-C-S and TT earthing systems.

This means you can install the **DEHNventil® M TT** in a container electrical distribution board and have complete protection

These units can take a direct strike and limit the voltage to less than 1,5kV as required by SANS 10142-1:2008 Table L.1.2.

### 3.2 **DEHNguard M TT (40kA) (8/20)**

In cases where a very high level of protection is required but Class 1 is not a requirement, we recommend that a **DEHNguard M TT** be installed. This unit consists of 3 x 40kA Class 2 surge arresters from Phase to Neutral as well as 1 x 12,5kA Class 1 arrester Neutral to Earth.

The main advantage of this combination is that it halves the clamping voltage Phase to Neutral when compared to the standard method of installing surge arresters from each Phase and Neutral to Earth and it can be used on all types of wiring applications, TNS, TN-C-S and TT earthing systems. In addition it has **pluggable** modules that can be replaced without the need to disconnect the power.

#### 4.0 Surge Arresters – Class 3 (8/20)

##### DEHNrail M 255V

When using Class 3 surge arresters there **must always** be Class 2 surge arresters installed **upstream** to ensure that the units will not be overstressed.

These units are typically 5kA (8/20) devices and are used to dissipate any surges that may be induced between the electrical distribution board and the equipment.

Class 3 surge arresters without internal disconnecting mechanisms may only be used in circuits that are supervised by earth leakage devices.

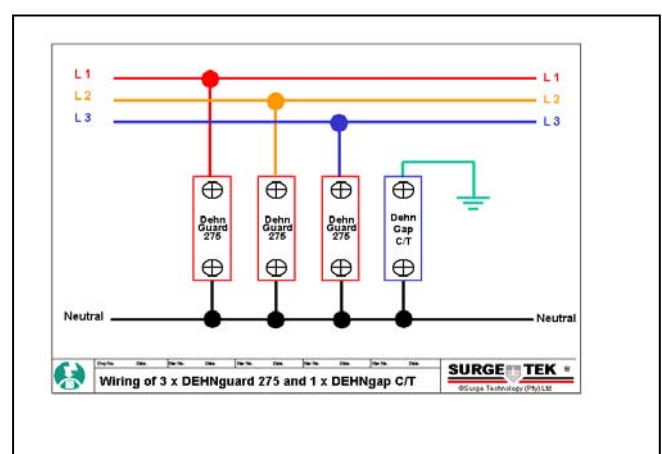
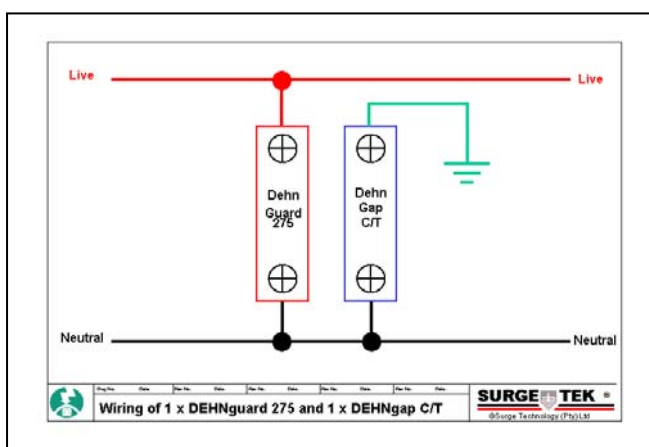
#### 5.0 Pre-Fusing of Surge Arresters

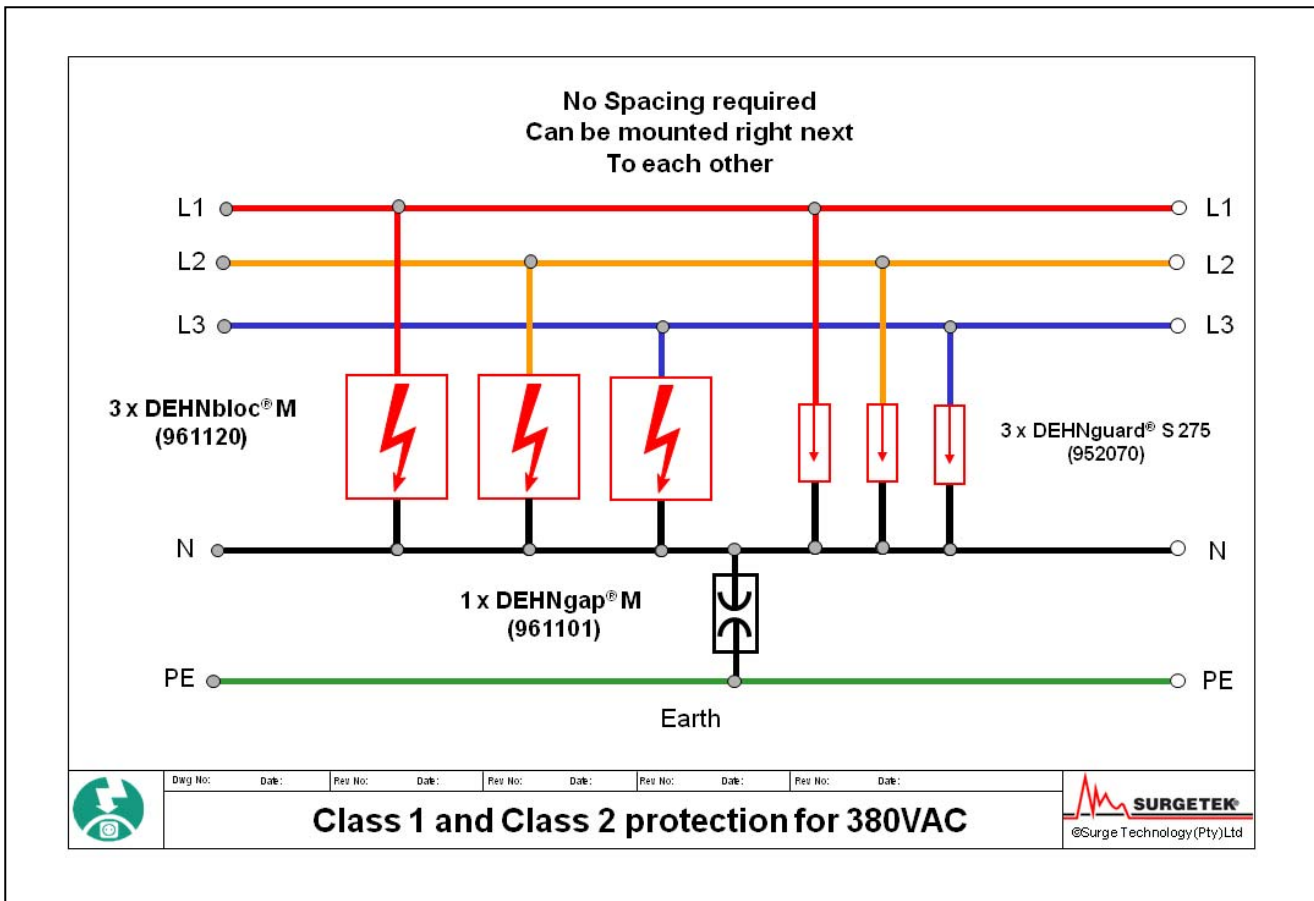
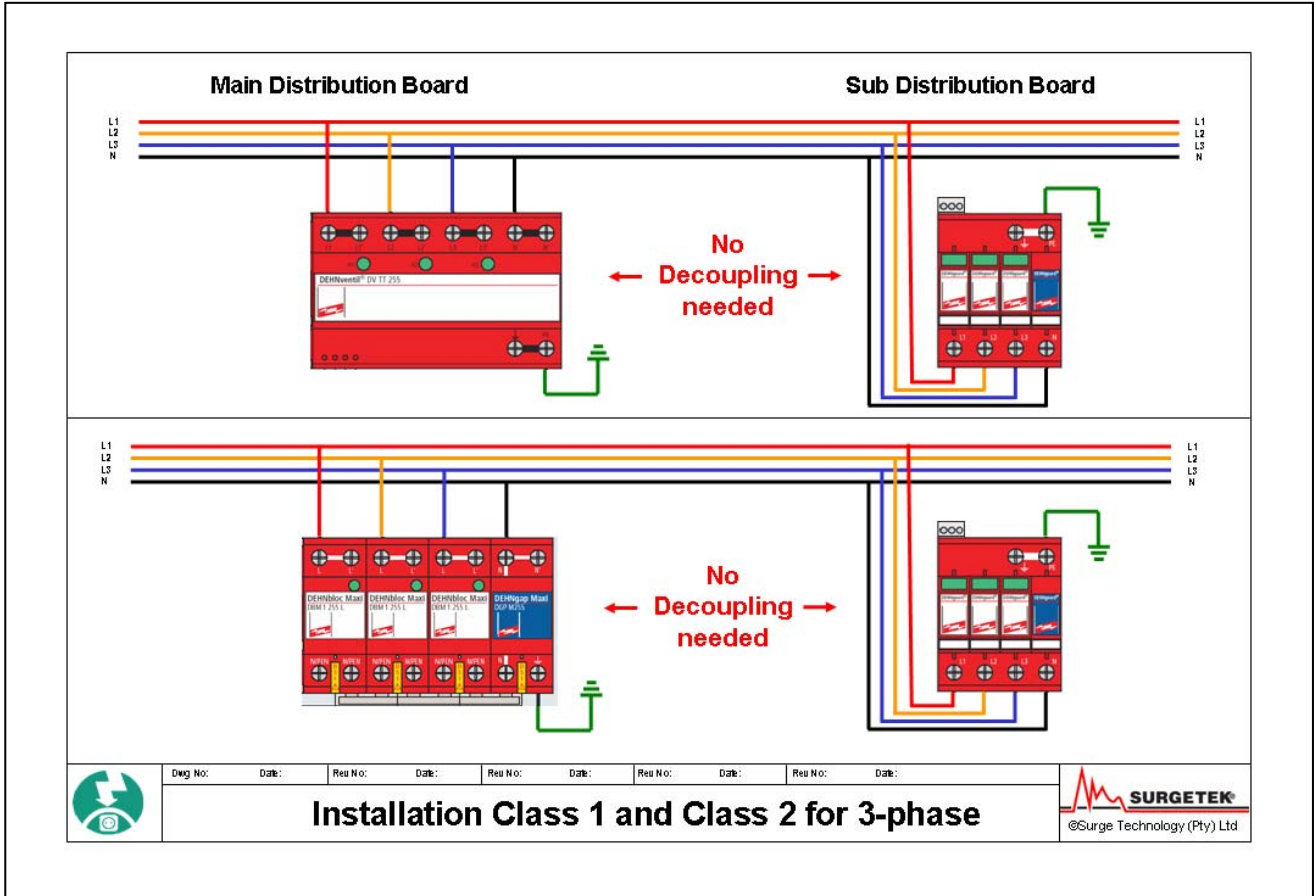
When surge arresters are installed in systems with a main breaker larger than 250 Amps or 5kA fault current, they should be pre-fused to prevent the units creating a danger when subjected to high fault currents. Due to the fact that the surge arresters are connected directly to the incoming supply and thus have no means of extinguishing the arc should they become conductive under electrical fault conditions. For Class 1 lightning current arresters we recommend that **315A** fuses and for Class 2 surge arresters we recommend that **125A** fuses, of the same fault current rating or larger than that of the board, be installed in series with the surge arresters to disconnect the surge arresters under fault conditions.

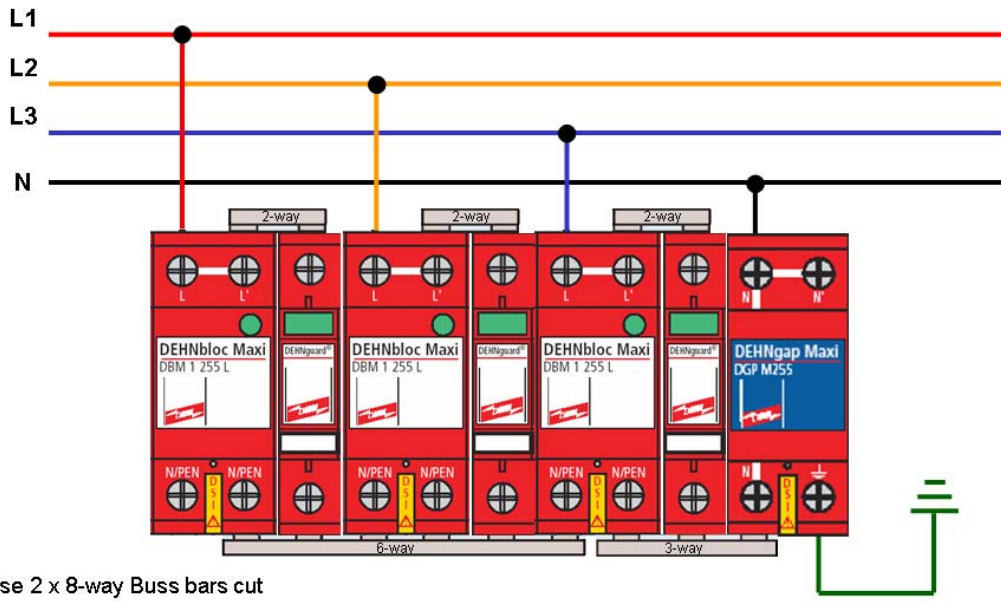
These fuses have **nothing to do with the normal operation of the surge arresters** but is purely for electrical safety.

#### 6.0 Installation mode of SPDs – Connection type 2 as per SANS Figure L.1.3

**SANS 10142:2008 section L.1.3.5.5 b)** states for connection type 2, the nominal discharge current ( $I_n$ ) for the SPD connected between the neutral conductor and the PE shall be not less than **20 kA (8/20)** for three-phase systems and **10 kA (8/20)** for single-phase systems (see [figure L.1.3](#)).





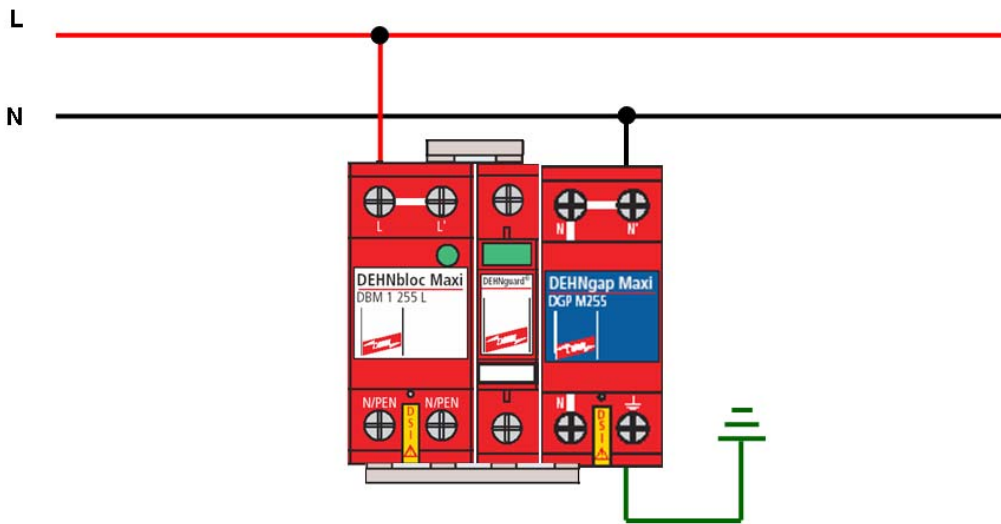


Use 2 x 8-way Buss bars cut as shown



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### Installation of Class 1 and Class 2 for 3-Phase



Dwg No:      Date:      Rev No:      Date:      Rev No:      Date:      Rev No:      Date:

### Installation of Class 1 and Class 2 Single Phase

