

Power Surge Protection Guidelines





Power surge explained

Most electrical devices are designed to connect to the electrical grid. These devices include appliances, TVs and computers that require a constant and specific voltage. If the voltage of the electrical supply increases or decreases beyond this consistent voltage, devices connected to this supply may become damaged.

A power surge happens when a boost (or surge) from the electrical grid occurs at some point between the power line and the connected device. This causes a temporary increase in the voltage of the electrical supply, which tends to increase the current flow through connected devices. The electronics and microprocessor controllers found in most household electrical appliances are especially sensitive to power surges and are often permanently damaged.

Factors that can cause power surges in a building's electrical network

Here are some common examples:

-  Lightning strikes as far as 10 kilometres away can cause damage to sensitive electrical equipment.
-  Turning on and off large appliances, such as air conditioners and refrigerator compressors, can cause voltage dips and spikes in the building's electrical network.
-  Large power surges that are generated when the power grid is turned on and off (load shedding), affect the entire local power network.
-  Running a generator that is not properly isolated from the utility's supply or not correctly rated (i.e. too small for the load) can cause voltage fluctuations and surges in the local network, as can plugging in faulty power adapters, extension cords, or appliances.

Question: If power surges are an inherent feature of lightning and our electrical network, then why didn't we need surge protection 50 years ago?

Answer: One of the main reasons power surges are occurring more frequently is the increase in load shedding in South Africa. The constant turning on and off the municipal power supply has played a major role in the increase of surges and has deteriorated, and in some cases, permanently damaged, important municipal infrastructure.

Another contributing factor is the large-scale adoption of complex technology devices in recent times. Nowadays most basic devices including washing machines, fridges, microwaves, computers, and TVs contain microprocessors and network cards of sophisticated electronic components that are sensitive to voltage surges.

How surge protectors work

The main function of a surge protector is to **protect electrical devices from temporary surges** in the supply voltage. If the voltage suddenly increases, the surge protector immediately reacts to contain this increase and protects electrical devices downstream of it. A surge arrester works on the same principles as a safety valve. During normal electrical operation, the arrester is ignored. Under a high-energy electrical condition such as a surge, the surge arrester will conduct this high energy to 'earth', diverting the damaging energy and ultimately protecting your household equipment.

A single home surge arrester that is fitted correctly in a building's electrical distribution board, available at a relatively minimal cost, **can protect equipment worth hundreds of thousands of rands against power surge damage**. However, most surge protectors don't prevent surges in data lines such as the ones that feed Wi-Fi routers and CCTV systems. You will generally need a **separate protector for data line surges**.



Types of surge protectors

There are different types of surge arresters, and the installation of the correct type is critical for protecting your devices or equipment.

Point-of-use or plug-point surge protectors (known as 'type 3' surge arresters)

A good Quality plug-point surge protector, combined with a good earthing system, should protect your connected device from an electrical surge.

The disadvantages are:

- ⊖ They only protect the single device directly plugged into the surge arrester, and no other devices.
- ⊖ They are only effective for minor surge events and must be used in combination with a type 2 arrester to be most effective.
- ⊖ They can be easily unplugged by someone in the building or home, leaving your device vulnerable to a surge.
- ⊖ They are typically only rated for smaller surges and need upstream protection to work efficiently.
- ⊖ It can work out to be an expensive option as you require

a number of them to protect all the sensitive equipment found in most modern buildings.

Surge arresters installed on the electrical distribution board (known as 'type 1' and 'type 2' surge arresters)

Installing a high-Quality permanent surge arrester in the building's main electrical distribution board, will under most circumstances protect the building's entire electrical system and the devices fed from this main distribution board.

The advantages are:

- ⊕ In addition to protecting all the devices plugged into any electrical socket in the building, these arresters also protect gate motors, alarm panels, lights, light switches and all other 'hard-wired' items in the building that do not plug into an electrical outlet.
- ⊕ They are more cost-efficient and effective than installing multiple plug-in surge arresters.

Surge Arrester Requirements

Your power surge cover will be limited, and you will be liable to pay an excess, if you do not have a surge arrester installed on the building's main electrical distribution board that complies with the following conditions. The device must:

- comply with the SANS/IEC 61643-11 low voltage surge protection standards and be a type 2 device.
- be designed to withstand at least peak surge currents of 40kA (I_{max}).
- be wired in terms of SANS 10142-1 Connection type 2.
- have a status indicator to indicate if it is operational or not
- be installed by a registered electrician.

Proof is needed to reduce excess or increase cover

We will ask you for proof of the installation and details of the surge arrester's specifications. We will accept one of the following from a registered electrician as proof:

- A Certificate of Compliance for the installation.
- Proof of installation stating the adherence to the required electrical standards and regulations at the time that the device was installed, as well as complete the Surge arrester checklist form, which you can request from your broker.

The Certificate of Compliance or proof of installation should ideally be provided to your broker once the device is installed.

If you are not able to provide proof of the installation or have not met the surge arrester requirements, at the time of claim, you will have to pay an excess and your cover will be limited (where you had the option to increase cover).

What about an inverter and an Uninterrupted Power Supply (UPS)?

The purpose of an inverter and a UPS device is not to prevent power surge. Although most inverters and UPS devices offer some protection against power surge, they are not usually suitable substitutes for a surge arrester and, at best, can only equalise the power supply to appliances. If you do make use of an inverter or a UPS to power your critical devices, it's very important that you don't let the battery drain completely on a regular basis before recharging – this damages the battery cells and reduces the lifespan of your inverter or UPS.

There is no real practical difference between a UPS and an inverter — they both provide an alternate source of power in the case of a power outage.

What about 'earth leakage'?

If there is an electrical current leaking due to an insulation fault, your earth leakage switch may trip on the building's main distribution board. This is not a surge protection device, but rather a safety device to prevent shock.

Useful tips to prevent power surge damage



Switch your oven, iron, and any other appliance that generates heat off when load shedding starts

It is easy to forget that these appliances were on when the power is restored. Leaving them on (and unmonitored) can have disastrous consequences, like the starting of a fire in your home.



Use an under/over voltage protector device for your fridge and freezer with a time delay

Your fridges and freezers each have a compressor that shuts down in the event of a power surge. The compressor restarts itself, but if the power supply is interrupted or surges again while the compressor restarts (a common occurrence during planned and unplanned power outages) the compressor can be damaged, and the appliance needs to be repaired or replaced.

You can significantly reduce the risk of power surge damage to these appliances by installing an under/over voltage and surge protector device with a time

delay (specifically for fridges and freezers) to connect them (one appliance per device) to the wall socket. You can find these devices at most hardware stores.



Unplug your high-value appliances during load shedding

Remember that you need to physically remove the plug from the wall socket and not just switch the appliance off. Your appliance can still be damaged if it is plugged into the wall socket even if it is switched off.



Use a UPS to connect your critical appliances

Not only will this ensure that you have uninterrupted power for these appliances during load shedding, but a UPS battery does also provide some power surge protection for your sensitive appliances.



Always consult a registered electrician

Don't take shortcuts with electricity in your home. Always consult a registered electrician who is able to ensure adherence to the current required electrical standards and regulations.

Terms and Conditions apply. This is a **power surge protection guidelines brochure**, which makes reference to the surge arrester requirements for your power surge cover. However, you need to refer to the policy wording and policy schedule for the details of the terms and conditions of your power surge cover.