

## Buying guide – SURGE SUPPRESSOR

### Introduction

A [surge suppressor](#) is essentially an electronic device that protects the internal circuits of electrical devices from getting damaged during sudden voltage surges or spikes. A voltage surge or spike is an instant rise in the voltage across a circuit. Voltage surges or spikes are caused by lightning, short circuits, power company equipment problems, and inductive spikes, among many other causes. Surges or voltage spikes are represented by sudden jumps in the electrical energy beyond the voltage and amperage capacity of the concerned equipment, causing harm to the equipment if not instantly suppressed. A surge is a small transitory wave of power in an electrical circuit. It characteristically measures less than 500V and lasts less than two seconds. A spike is an immediate rise in the voltage, much shorter in duration than a surge. Even though it exists for less than one-thousandth of a second (millisecond), its magnitude could be thousands of volts.

Even the most minor and shortest surge can damage and cause to stop functioning equipment such as [TVs](#), [VCRs](#), gaming consoles, computers, phones, faxes, stereos, and [microwaves](#). Some miniscule undetected surges may not cause instantaneous damage, but over a period of time could result in a gradual corrosion of internal circuitry. Surge suppressors are useful nowadays especially where there is widespread usage of microprocessor chips that are highly sensitive to voltage fluctuations. Surge suppressors come in a wide variety of styles.

### Workings of a surge suppressor

As soon as a potential surge or spike is detected, the surge suppressors direct this excessive voltage to ground. Thus, by using a surge suppressor you are somewhat assured that the voltage to your precious electronic and electrical equipment will never go beyond a certain safe limit. A surge suppressor is not a guaranteed that ensures that the motherboard of your electronic equipment or any other internal circuit will never be damaged by voltage rises, but it does ensure a certain level of protection.

### What to look for in a surge suppressor

Considering the technical nature of this gadget, going out there and buying a surge suppressor can be a little tricky. Below, we have listed the main features you need to check at the time of making the purchase. The information should help you make an informed decision:

#### 1. Circuit breaker

The circuit breaker stops the flow of electricity when a circuit could get overloaded. The circuit breaker is not directly associated with surges or spikes.

#### 2. Response time

This time measurement indicates the time required for the surge suppressor to respond to a surge or spike. It is obvious that faster is the response time, better is the surge suppressor.

#### 3. 3-Line protection

Surges usually occur between the hot, neutral, and ground lines. Therefore, one must opt for a surge suppressor that provides surge suppression along all three lines.

#### 4. Cable line, Digital satellite line & Phone line protection

Surges and spikes can also occur in cable lines, digital satellite lines, and phone lines. It

is, thus, recommended to have surge suppression connected here as well. Surge suppressors with specially designed digital satellite jacks, coax line jacks, and phone line jacks are available for these lines.

## **5. EMI/RFI**

Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI) are caused due to the effect of electromagnetic energy and radio-frequency electromagnetic radiation respectively. These effects cause early wear of electronic components. As far as EMI/RFI specs are concerned, wider the frequency range (kHz to MHz) greater is the noise reduction in decibels (dB) across that frequency range and also better is the filtering.

## **6. Power shut down protection**

This facility causes the power to all outlets to shut down instantly as soon as the unit reaches its maximum power capacity. This feature eliminates the chances of further surges and spikes reaching attached appliances prior to the surge suppressor being replaced.

## **7. UL 1449 clamping voltage**

The surge suppressor you opt for should have a clamp voltage that has been rated by the Underwriters Laboratories (UL). Lower the rating, better the protection. The lowest UL rating for clamping voltage is 330 volts.

## **8. Ground indicator light**

Most surge suppressors come with ground indicator lights. Ground indicator lights are important as these light indicate that the ground line is intact and is able to offer protection.

## **9. Indicator light**

Indicator lights indicate that the unit is under surge protection. When the unit crosses its capacity, the light goes off, indicating the unit is now prone to surges and spikes.

## **10. Alarm**

The alarm feature comes in handy when a unit does not have power shut down protection or when the indicator light does not work or is beyond the range of vision. In these cases, the alarm alerts the concerned persons of the surge suppressor not being functional. Thus, it can be immediately replaced.

## **Making the right decision**

After going through the above information, you should now have an idea of what a surge suppressor is all about and what is its function. In addition to the functionality and the features of the surge suppressor, another point worth considering is the after-sales support offered by the manufacturer and the warranty of the product. This is an important consideration as only a few manufacturers offer to bear the cost of recovering lost data in a computer due to hard disk failure caused by surges or spikes. Some of the high-end surge suppressors are shipped with a Connected Equipment Warranty (CEW). This

means that if any device is damaged due to a surge or a spike, the surge suppresser company is under obligation to reimburse the cost of replacing the product.

## Decisions, decisions....

Surge suppressers come in many shapes and forms for many purposes, not just the plug-in kind that you find in the electronic stores. There are several ways to install them on your power supply: plug and play, do-it-yourself, hire a licensed electrician to do it, or even call on your power company to do it. Here is a rundown on your options, and who does it:

### Plug-in surge suppressers

This is the easiest solution, and there is a wide variety of brands available in the stores. These come in two forms: a box that plugs directly into a wall receptacle, or a strip with a power cord and multiple outlets. Depending on the appliance, you will look for a simple AC power plug-in, or a more complex combined suppresser for AC power and telephone or cable - more on that later.

There is another decision to make, concerning how a surge suppresser will power your appliance if the protective element should fail under extreme cases of exposure to a large surge or large swell. Most surge suppressers are provided internally with some kind of fuse that will disconnect in case of failure. However, this disconnect can operate in two different ways, depending on the design of the surge suppresser: some will completely cut-off the output power, others will disconnect the failed element but maintain the power output.



For you, it is a matter of choice: would you want to maintain the output power to your appliance - but with no more surge protection? Or would you rather maintain protection for sure - by having the circuit of the suppresser cut off the power supply to your appliance, if the protective function were to fail? To make an intelligent decision, you must know which of the two possibilities are designed into the surge suppresser that you will be looking for.

### *What are the lights telling you?*

To help the consumer know what is going on inside the surge suppresser, many manufacturers provide some form of indication, generally by one or more pilot lights on the device. Unfortunately, these indications are not standardized, and the meaning might be confusing, between one, two - even three or four lights - where it is not always clear what their color means. Read the instructions!

### More decisions...

So far, we have looked mostly at the plug-in surge suppressers because they are the easiest to install and they do not require the services of an electrician. The two other possible locations for surge suppressers are the service panel (breaker panel) and the meter socket.

### Service-panel surge suppressers

Instead of using several plug-in suppressers - one for each sensitive appliance is sometimes recommended - you can install a suppresser at the service panel of the house (also called "service entrance" or "breaker box"). The idea is that with one device, all appliances in the house can be protected, perhaps with a few plug-in suppressers next to the most sensitive appliances. There are two types of devices available: incorporated in the panel, or outside the panel.

Some breaker panel manufacturers also offer a snap-in surge suppresser, taking the space of two breakers (assuming that there are blank spaces available on the panel), and easily installed by the home owner or by an electrician.

However, there are two limitations or conditions to that approach:

(1) The snap-in suppressers generally fit only in a breaker panel from

the same manufacturer - possibly down to the model or vintage of the panel.

(2) To install the snap-in suppresser, you must remove the front panel (turn off the main breaker before you do that!). Most cities have codes allowing the home owner to do it, under some conditions. Check with your local authorities to find out if they allow you to do that, or hire a licensed electrician to do the installation for you.

There are other surge suppressers packaged for wiring into the service panel, either within or next to the panel. That kind of installation is best left to a licensed electrician.

### At the meter socket

There might be a possibility that the power company in your area offers, as an option, to install a surge suppresser with a special adapter, fitting it between the meter and its socket (the dark band in the bubble of the picture). But that type of device and installation is out of the question as a do-it-yourself project, and will require cooperation from the power company, if they do offer the program.



Other types of outdoor surge suppressers can be installed near the meter. That kind of installation must be done by a licensed electrician.

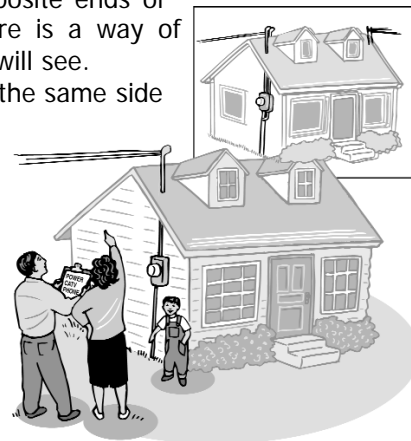
### Check list...

Before you decide which way you want to protect your appliances, there are other points to consider, perhaps this is a good time to make a check list. You should have an idea of the variation in lightning activity across the country: Florida is known for very high lightning activity, the West Coast for much lower (but not zero) activity. For a given area of the country, the type of your dwelling, and what kind of appliances are to be protected will influence which type of surge suppressers you will be looking for.

### Where do you live?

This is an important question because the type of dwelling has some effect on how severe your surge problem might be. In a somewhat simplified way, consider three categories according to the arrangement of the utilities:

- Detached house with power and telephone and/or cable TV drops at opposite ends of the house - the worst possible arrangement of all. But do not fret, there is a way of compensating, even after the fact, for this unfortunate situation, as we will see.
- Detached house with all services (power, cable TV, phone) entering on the same side of the house.
- Townhouse or apartment building with services entering the building at one point and fanned out to the different dwellings - about the same as the case of the detached house with all services on the same side.



## What appliances are you using?

From the surge protection point of view, there are four kinds of appliances, with examples listed below by order of increasing sensitivity to surges, either because of their nature or because of their exposure:

- Motor-driven and heating appliances  
Washers (dish and clothes), food processors, power tools, heating and ventilation motors, pumps, etc.  
Water heaters, space heaters, toasters, incandescent light bulbs
- Free-standing electronic appliances  
Computers without modem, table radios, TV sets with rabbit ears  
Compact fluorescent and modern tube-type fluorescent lamps
- Communications-connected appliances  
Computers with modem, TV with cable or satellite antenna  
Fax machines, telephone answering/recording machines
- Signal systems  
Intruder alarms, garage-door openers, sprinklers, intercom

## Motor-driven appliances and heating appliances

For each of these two categories, there can be two or more kinds, depending on the type of control used.

- Mechanical control (ON-OFF switch, rotary control, etc.), no sophisticated key pad or other electronic control
- Electronic control (programmable operation, key pad, display, etc.)

Appliances with mechanical controls are generally insensitive to surges and can be expected to withstand the typical surges that occur in a residence. Extreme cases, such as a direct lightning strike to the building, or one to the utility, very close, might cause damage.

Appliances with electronic controls can be more susceptible to damage than those with mechanical controls. Less traumatic but annoying can be upset memory in programmable appliances, although progress is being made in providing more built-in protection.

Another difference to be noted is that of appliances permanently connected, as opposed to those in intermittent use. The risk of a damaging surge happening at the time of intermittent use is much smaller than that of an appliance which is on all the time.

## What kind of appliances?

### Electronic appliances

*As soon as the word "electronic"* is mentioned, your friends will tell war stories of surge damage that can raise justifiable concerns. But fear not; simple precautions and proper protective devices can go a long way to avoid problems and replace those concerns by confidence. Some companies sometimes suggest disconnecting your appliances when a severe lightning storm is approaching. But that is no help if you are not in the house at that time. If, on the other hand, you are in the house, pulling out the power cord of an appliance that remains connected to a telephone line or cable TV might not be the best idea: you would lose the grounding of the appliance normally done by the

power cord - possibly a safety problem should a surge come upon the telephone or cable TV.

By showing you the basic principles of surge protection, this booklet should help you make the choices that fit your needs for protection, without overdoing it. To make the right choice, it is useful to note that there are two types of electronic appliances. For each of these types, a different type of surge suppresser might be needed. These types include:

- Simple, one link connection to power the system
- Dual connection to both power and communications



### One-link connections

Examples of one-link connection of powered electronic appliances include a TV set with "rabbit ears" antenna, a portable radio receiver, a computer with no modem connection or remote printer, a compact fluorescent lamp, etc. In the category of one-link connection we also find an old-fashioned telephone connected only to the telephone system.

Note that most of these have a two-prong plug, which is their sole connection to the power system. For the TV set, a simple AC plug-in surge suppresser on the power cord would be sufficient. For just the lamp, the cost of a surge suppresser would be greater than the cost of simply replacing the lamp, if damaged by a surge - and therefore not be justified.



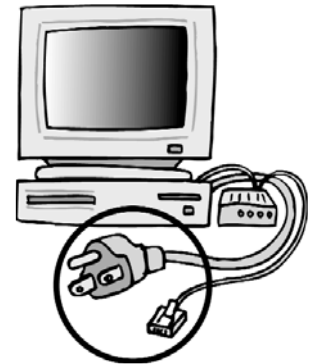
One Cord

### What kind of appliances?

#### Two-link connections

This type of appliance is another matter. Typical of these would be a computer with a modem, a video system with cable or satellite link, a phone system directly powered from a receptacle (those with a large adapter plug and a thin cable with jack which goes to the appliance generally have sufficient internal isolation against surges).

Two cords



The surge problem with this type of appliance is that a surge coming in from one of the two systems - power or communications - can damage the appliance, because of a *difference* in the voltage between the two systems when the surge occurs. This can happen even when there are surge suppressers on each of the systems. Fortunately, you can find a special type of surge suppresser to protect against the problem, as described next.

### Equalizing differences

A simple solution to the problem of voltage differences for two-link appliances is to install a special surge suppresser that incorporates, in the same package, a combination of input/output connections for the two systems. Each link, power and communications, is fed through the suppresser which is then inserted between the wall receptacles and the input of the appliance to be protected. This type of surge suppresser is readily available in computer and electronics stores, and the electrical section of home building stores.

In addition to words on the package, it can be recognized by the presence of either a pair of telephone jacks or video coax connectors in addition to the power receptacles. Some models might have all three in the same package. Do note a few words of caution: (1) Read carefully the instructions or markings to find which is "in" and which is "out" for the telephone wires. It is important to note, before you buy the product, whether your wall receptacles are wired for three-prong power cords. Some of these combined suppressers might not work very well if plugged into a 2-blade receptacle, using a "cheater" plug. (On some, an indicating light will signal that.)



Below is a list of "some" reputable suppliers of surge suppression equipment.

[www.tripplite.com](http://www.tripplite.com)

[www.leviton.com](http://www.leviton.com)

[www.surgesuppression.com](http://www.surgesuppression.com)

[www.geindustrial.com](http://www.geindustrial.com)

[www.eaton.com](http://www.eaton.com)