Power Supply Overvoltages EXPLAINED

Overvoltage is a serious issue that can lead to damaged equipment, fire or injury.

Rather than explain it with technical jargon, we are after all in the furniture industry, not electrical geeks, imagine a round bottomed bowl.

A round bottomed bowl, which is free to move, will rest evenly on a flat surface

With three equal weights, clipped evenly around the rim, the bowl will remain balanced

With different weights, the bowl will tip to one side, the heavier weight being lower

Transposing this to a 3 phase electrical system, where the weights are considered as electrical loads (eg: appliances) and the voltages are related to the height of the weights above the flat surface

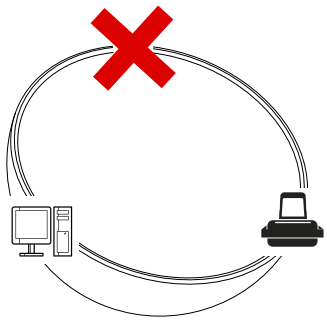
- When the electrical loads connected to the system are the same, the electrical system is a "balanced 3 phase system". The voltages of the phases (heights of the weights) are all the same – at 230Vac (or 110Vac in some countries)

- When the electrical loads connected to the system are different, the electrical system becomes unbalanced. The voltages of the phases (heights of the weights) become different with some being higher than 230Vac and some being lower

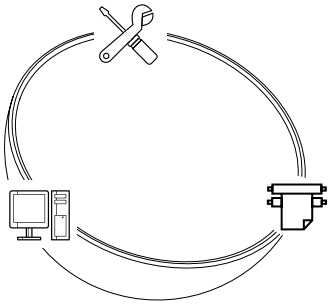
Single phase appliances (eg: computers) won't generally suffer an issue with an undervoltage (eg: 130V), they simply may not work. However they DO NOT like an overvoltage (eg: 330V) which can lead to overheating; damaged components; or even short circuits that could cause an electrical hazard or fire.

In the real world, two examples may be:

Within a business, there may be 3 different areas running on separate phases. If one area has big machines with motors, a second area has low power computer equipment and a third area has nothing – then it is easy to imagine that the electrical system will suffer different effects caused by the loads in each area.
If something is not done the system will be unbalanced with higher and lower voltages around the business.



However, don't just think that it is the business' own loads that have an effect



In a business centre, where separate businesses run on different phases of the building supply. If one company runs some large loads (eg: printing equipment), another runs small loads (eg: computers) and a third only employs assembly workers with no electrical load, then the building electrical system can be unbalanced. One business may be experiencing low or high voltages, due to another business, through no fault of its own.

Effectively, overvoltages can be caused by external factors over which you have no control

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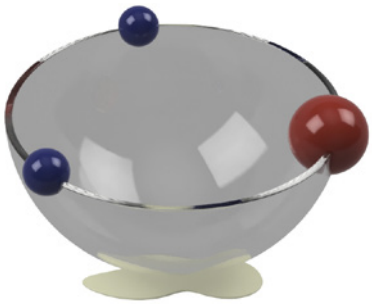
So, how do you solve overvoltages, especially when you may not be able to control the mixture of electrical loads (ie: weights on the rim of the bowl)?

How do you keep the system balanced?



Well… in the bowl scenario you would glue the bowl down, so that it can't tip over.

In an electrical system, the equivalent is to tie the Neutral of the Installation to the Neutral of the Supply. Then the voltages between neutral and the 3 phases will stay the same (230Vac or 110Vac as appropriate)

Tieing the Neutrals together is standard electrical installation safety practice and would be checked, by a qualified inspecting electrician, before a building is handed over to the owner.

However during the process of electrical installation, there is always the possibility of human error and it may only be after energizing the system, for electrical testing to be done by the inspector, that a loose/'floating' neutral is discovered. But once fixed, the problem should not re-occur unless the electrical system is later modified or repaired

Until recently, the only types of equipment that may be pre-connected to an untested supply would tolerate an overvoltage for a brief period (eg: lighting) and indeed sometimes it is the effect on these appliances that can be the first signal to the installers that there is a floating neutral, as the lights will flicker or be too bright/dim.

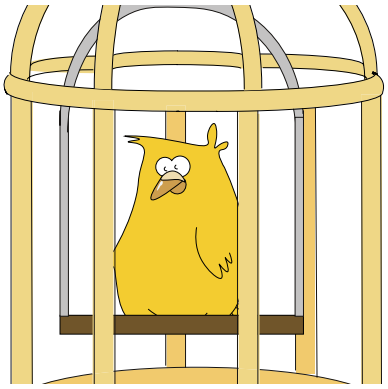
Certainly no-one would consider connecting computers or other sensitive electronic equipment to an untested supply – because the effect on these types of equipment can be dramatic and potentially dangerous

The issue, and the reason for this document, is that as a result of the increasing popularity of mobile devices that charge from a USB outlet, new/modified electrical installations may have USB chargers installed from the outset, eg: in a wall socket, or as part of the soft wiring.

However, USB chargers contain sensitive electronic equipment and if subjected to an overvoltage, as a result of being energized on an untested and incorrectly connected electrical system, they could be irreparably damaged.

TUF is such a piece of sensitive equipment and it **MUST NOT** be connected to an untested electrical supply

If TUF is connected to an untested supply, and that supply has a loose/'floating' neutral causing an overvoltage, then TUF will simply become the 'coal miner's canary' and it will expire, before anything else, when the installation is first energized for testing.



OE Electrics will not warrant a TUF that has been exposed to an overvoltage or connected to an untested electrical supply

OE Electrics accepts no responsibility for any consequential damage caused by TUF as a result of energizing it on an untested supply or subjecting it to an overvoltage

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