

Single and three phase power explained

So what's it all about?

Single and three phase power are technical terms that are used frequently within the power industry, but how do we differentiate the two? A three phase system is deemed more efficient for high-capacity installations, but much more costly to install. Three phase utility power is generally only available in industrial and commercial areas.

The potential benefits of three phase power

While most electronics operate on single phase power, it can be more efficient to install a three phase system in the data centre. Three phase systems enable the consolidation of power circuits with three phase power distribution cabinets that have a much greater distribution capacity. A single three phase power distribution cabinet can power multiple racks, which offers a more efficient alternative to installing multiple single phase circuits which will incur further labour and cabling costs.

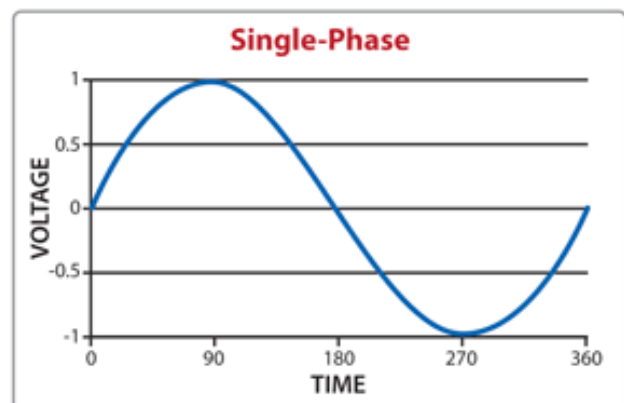
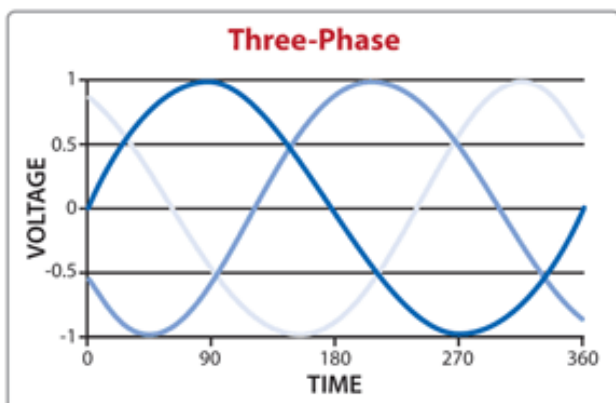
How three phase power can be more efficient

The efficiency saving with three phase power has a knock on effect, as the increase in power efficiency reduces the amount of power distribution equipment that must be installed - which therefore reduces labour and installation costs.

By reducing the amount of equipment that physically occupies the data centre, the cooling equipment is reduced - which ultimately contributes to conserving energy. However, a three phase system is only efficient if the load is large enough to merit the installation costs - so it all depends on the size and the application.

How it all works

A three phase power circuit combines three alternating currents at the same frequency, each 120 degrees out of phase with each other. This produces three separate waves of power, as demonstrated in the diagram below. The power in a single phase supply falls to zero three times per cycle, whereas the power in a three phase supply never drops to zero. Therefore the power delivered in a three phase supply is constant.



While actual efficiency depends on the load to capacity ratio, the nominal ratio between the efficiencies is 1.5 in favour of three phase when comparing single and three phase power.

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