

What is Power Factor?

It is a measure of how efficiently electrical power is consumed. The desired Power Factor is unity - or one. Anything less than one, (or 100% efficiency), means that extra energy is needed to achieve the actual work at hand. This extra energy is known as Reactive Power, which unfortunately is necessary to provide a magnetizing effect required by motors and other inductive loads to perform the work required of them. Another way of stating it, reactive power can also be defined as watt-less, magnetizing or wasted energy and an extra burden on the electricity supply.

What is Power Factor Correction?

It is the term given to a technology that has been used to restore Power Factor to as close to 100 percent efficiency as practical. Adding capacitors to the electrical system is the most common way to reduce the negative effects of large inductive loads such as motors and pumps.

Why Correct my Power Factor?

Energy consumption is reduced and your bills will be reduced as well. By correcting your power factor, it makes more power available for other members on the system, reduces transformer losses, and it reduces voltage drops on long cables to name a few. Power Factor Correction will usually show payback within a couple of years. In addition, improving your power factor is environmentally the right thing to do. It reduces the overall need for more generation.

A simplified example of Power Factor:

Power Factor is generally calculated as Active Power kW ÷ Apparent Power kVA.

We find a 100kW motor operating at a Power Factor of 0.80. The total or apparent power required by the motor is actually 125kVA (100kW ÷ 0.80). If we can improve the Power Factor to 0.95 the total power draw from the supply will be reduced $100\text{kW} \div 0.95 = 105\text{kVA}$.

Please note this calculation has nothing to do with true power. True power is kW and the motor is still rated at 100kW, however, the Apparent Power in this case will be cut by 16% and more importantly, the user of the motor will not be charged by his supplier for Reactive Power, so there may not be an energy saving as such but there will be a financial saving. Actual energy savings will depend on many factors such as resistance of the wire and the transformer supplying the motor.