Power factor correction

Avoid the hidden surcharge

Changing the charge

Most power companies include demand charges in their rate structures for all non-residential customers. A demand charge is based on the maximum amount of electricity consumed during peak periods. The demand charge is billed even when consumption is below peak.

The demand charge can be measured in various units. Commonly used units are kVA demand, kW demand, and kW demand with a power factor (PF) penalty below a specified value. Power factor measures how effectively power is being used. The utility charges for this low power factor can be costly—even when it's not used by the facility.

Kilovar (kVAR) represents the energy required by inductive loads to generate magnetic fields, such as in motors and transformers, and accounts for a portion of the system losses. Kilovars consume capacity but do not provide useful work. Power companies charge a PF penalty or surcharge to recoup kVAR losses. Making a one-time payment through the application of PF capacitors on the load side of the billing meter negates this monthly surcharge.

Eaton's integrated project solution

- Power factor study or mini–power factor study
- Load flow study
- Related harmonic audit/study
- Power quality survey/study
- Turnkey field installation, startup and commissioning of equipment

All of the above result in an engineered solution and/or an integrated project solution.

Return on investment

The ROI is dependent on the load characteristics, utility rate structure and possible complicating factors, such as the presence of harmonics and the scope of the installation. A typical payback can be realized in less than two years, and, in many cases, a payback of one year or less is possible.

When increased system capacity is sufficient to accommodate load, immediate payback will occur by eliminating the need for a larger service transformer.

A case study in savings

A commercial building in Pittsburgh, PA, had a low power factor and was penalized $1,932 per month by the utility. A $12,000 power factor correction capacitor bank, expertly installed by Eaton, corrected the power factor to 0.95 and eliminated the penalty, resulting in a payback period of approximately six months.

Facility profile

- 1500 kVA transformer
- 1146 kW demand
- PF range = 0.86 to 0.88

Utility charges

- $12/kW demand charge (kWD)
- Penalty below 0.95 PF
- PF penalty multiplier = 1.14 (PFM)
- 1307 kW (billed) – 1146 kW (actual) = 161 kW (penalty)

ROI calculations

- Billing kW based on PFM x kWD = 1.14 x 1146 kW = 1307 kW
- Penalty based on cost of 161 kWD = $12 x 161 kW = $1,932 / month
- Simple payback period = $12,000/$1,932 = 6.2 months

UNIPAK power factor correction capacitors and harmonic filtering

Powering Business Worldwide

Integrated solution summary

Our sales and engineering professionals have the expertise to correctly apply power factor correction capacitor banks. Without doing this, precious financial resources will be lost. Additionally, the proliferation of harmonic generating drives, soft starters and other nonlinear loads further complicates the problem. Installation of these products may require that the entire system be evaluated to avoid damage and additional costs.

- **Asset optimization**—Outsource the responsibility for your electrical distribution system and associated equipment to Eaton; offerings involve shared cost savings and performance guarantees for greater focus on your core business
- **Knowledge management**—Collect and transform your system data to useful knowledge, and allow for proactive planning, energy management, optimized decision making, failure prediction and, ultimately, cost savings
- **Integrated project solutions**—Procurement, installation and commissioning of power systems equipment; a total turnkey approach
- **Power systems engineering solutions**—Power systems automation, design engineering, training, predictive diagnostics, power quality and power systems studies/analysis to decrease costs and increase productivity
- **Power systems modernization**—Keep your system operating at peak efficiency, reliability and safety through equipment life extension and upgrade solutions using new technologies
- **New equipment services**—Installation, testing and commissioning of virtually any electrical equipment
- **Field services**—Power system and equipment service, maintenance programs, testing, upgrades and aftermarket solutions; 24/7 emergency service; crisis response

For further information, please visit our Web site at: www.EatonElectrical.com and click on Solutions and Services, or contact your nearest Engineering Services office.

Eaton offers a complete line of power factor correction solutions

- **Low and medium voltage fixed PFC systems**—available from 1 to 400 kVAR for motor and small facility loads
- **Low and medium voltage switched PFC systems**—available in almost any configuration for industrial and varying loads
- **Passive harmonic filter versions**—available for low and medium voltage products for the growing numbers of high harmonic applications
- **Active harmonic filters**—available where IEEE519 must be met
- **Transient-free static switches**—available to correct fast-acting applications such as spot-welding loads

For further information, please visit our Web site at: www.powerfactorsolutions.eaton.com.

Harmonic correction units

Fixed and switched power factor correction solutions

Powering Business Worldwide

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