

Connectivity within commercial operations



Building automation represents a serious growth opportunity for panel builders. New technology makes upgrading switchgear a smart move.

Companies need smart ways to save energy and reduce operating costs. Building automation is the logical solution: connect everything into a powerful, central control system, collect operational data and identify the potential savings. The only problem is that for most users the actual load shedding is often too complex to deliver.

The answer lies in upgrades to the switchgear, which not only make them smarter, but also more competitive.

Most companies these days are committed to carefully controlling the power consumption of their buildings, and while environmental sustainability is a concern, mainly this is driven by the need to manage costs effectively. For this, automatic control of the loads, based on the absorbed power, is an optimum solution.

The target of such control systems is to modulate the demand for electric energy by avoiding a non-coordinated operation

of the loads. On a hot summer's day, if all the air conditioners start to work at the same time, it causes consumption peaks and problems with energy supply.

To avoid exceeding the limits agreed with utility suppliers, facility managers may find themselves raising the initial limits; consequently increasing costs. In some cases the response is to install a large number of dedicated control devices. The more loads there are to be managed, the more complex the electrical assembly becomes. This can command a lofty initial investment when taking into account the complexity and the extra time required to design and to complete the application.

Electricity billing by the utilities is often comprised of a two-part tariff structure, whereby one part depends on the power demand (kVA or kW), while the other depends on the actual energy drawn (kWh) during the billing cycle. Some utilities also record and bill the user for reactive energy, as this also affects the load on the electrical lines. The utility bill includes charges for, among other things, maximum demand, active energy and reactive power drawn.

Energy companies can use tariff structures to influence the end-user's consumption, such as: time of use tariffs, penalties on exceeding allowed maximum demand, correct demand, night tariffs, and concessions. Since demand charges make up a considerable portion of the bill, there is a real need for integrated load management to provide effective control.

ABB is looking at ways to make it simpler for panel builders to offer energy savings, as well as more intelligent, connected switchgear. For instance, integrated into the ABB Emax 2 is the Ekip Power Controller, an easy-to-use control system. The system is designed to limit the average

To avoid exceeding the limits agreed with utility suppliers, facility managers may find themselves raising the initial limits; consequently increasing costs.



power consumption in any defined time interval to a pre-determined maximum value. The result is an effective way of ensuring a building stays within its contractual limits.

ABB's algorithm helps the building manager to identify the non-priority loads that can be disconnected – and for how long. These loads are then reconnected as soon as the algorithm calculates that the average power demand identified by the utility contract is no longer being exceeded.

Thermal and refrigerating loads in industrial settings and HVAC loads in residential and commercial buildings are often the obvious candidates. Such loads can usually work in a certain temperature range and can tolerate some deviations from the optimum value. This makes it possible to reduce or increase the energy consumption whenever necessary, with limited impact on performance.

Lighting can be similarly managed. By reducing the light flow of a group of lamps, for example, the minimum level of light

defined by the designers can still be maintained. In some installations, the starting of motors connected to pumps such as swimming pool circulators can be delayed. The charging systems for electric vehicles can also be managed by modulating the power absorbed by the batteries over short periods.

How Ekip works

The algorithm of Ekip Power Controller consists of four steps, measuring, synchronising, evaluating and managing the load.

First, Ekip measures the total power flow through the Emax 2 circuit breaker, which implements the function. This value is then integrated to obtain the total energy. When each reference time interval has elapsed, the energy is set to zero.

To synchronise, the algorithm defines the time intervals in which average power is measured based on the clock inside the trip unit. A 15-minute period is typical. At regular intervals throughout each reference period, Ekip starts the evaluation module. It can also be synchronised using

an external signal from a smart meter.

Ekip's algorithm then evaluates whether the demand is too high based on the energy measured and the time elapsed. If the average power limits are likely to be exceeded, it will decide to decrease the existing load configuration. The system then decides which loads should be the first to be disconnected, depending on the rules and priorities programmed in.

ABB installed Emax 2 circuit breakers with Ekip power controllers at its divisional headquarters in Bergamo, Italy. The primary function of the circuit breaker is to reduce the total power absorbed from the Grid. By facilitating communication and data transference between each of the plant's four MV/LV transformers, adjustments could be made based on the unit's specific needs at any given time, lowering costs and improving performance.

As a result of installing the technology, the building is able to save up to 400 kW of HVAC loads with a saving of approximately €11,000 per year.

Other benefits

Because traditional meters and separate bolt-on energy management systems are no longer needed, panel builders can save installation space, assembly time and copper and material costs. Depending on the switchgear, ABB calculates that fitting Emax 2 can yield space savings of 20-30% and can lower material costs by 20-25%.

When buildings are equipped with several sources of electrical energy; solar photovoltaics, cogeneration, diesel generators. Emax 2 is able to protect the generation set as well as the distribution system from spikes in power demand.

For example, Emax 2 can offer protection against abnormal voltage and frequency conditions while also monitoring the power flow. For the manufacturer of the paralleling panel, this means no more external relays, current sensors, voltage sensors or even multimeters.

Most companies are committed to controlling the power consumption of their buildings, and while environmental sustainability is a concern, mainly this is driven by the need to manage costs effectively.



It also means an increase in the reliability of the entire installation. For Petroamazonas, Ecuador's state-owned oil company, maintaining continuous energy supply and process up-time are key success factors. ABB has supplied an integrated intelligent energy management solution using Emax 2 circuit breakers to the company.

The technology has been installed in four new facilities across Ecuador where diesel generators supply electricity for essential plant processes such as pumps and drills.

Emax 2 supports this by accurately protecting and supporting the balance between power consumption and power supply. Having seven communication standards embedded, it can integrate into any automation or supervision system.

Emax 2 protects the power network, and its integrated communication modules also connect with Petroamazonas EP's local control systems, giving operators real-time access to energy consumption data. Through a remote diagnostic function, it can interface with the plant's central intelligence to keep operations running smoothly by using preventive maintenance.

It is estimated that the addition of the integrated intelligent energy management solution will help Petroamazonas EP to gain up to an extra week of productivity annually, through the technology's capacity to prevent unexpected generator shutdowns.

ABB

The more loads there are to be managed, the more complex the electrical assembly becomes. This can command a lofty initial investment when taking into account complexity and time.

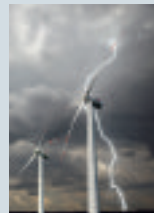


DEHN protects.

Your safety is our concern with

- Surge Protection
- Lightning Protection
- Safety Equipment

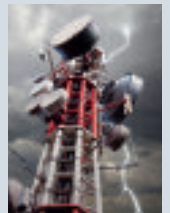
in many industries:



Wind Energy



Photovoltaics



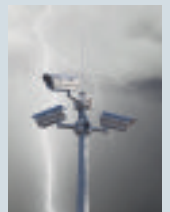
Communications



Process Industry



Transportation



Security Systems

DEHN (UK) Ltd
www.dehn.co.uk

Unit N8b Meltham Mills
Meltham, Holmfirth, HD9 4DS
Tel: 01484 859111 Fax: 01484 859222
Email: info@dehn.co.uk