



On a global scale

Big is beautiful – 06

Data center power trends

Downtime eliminated – 12

Modular UPS can prevent costly downtime in data centers

New generation energy storage – 16

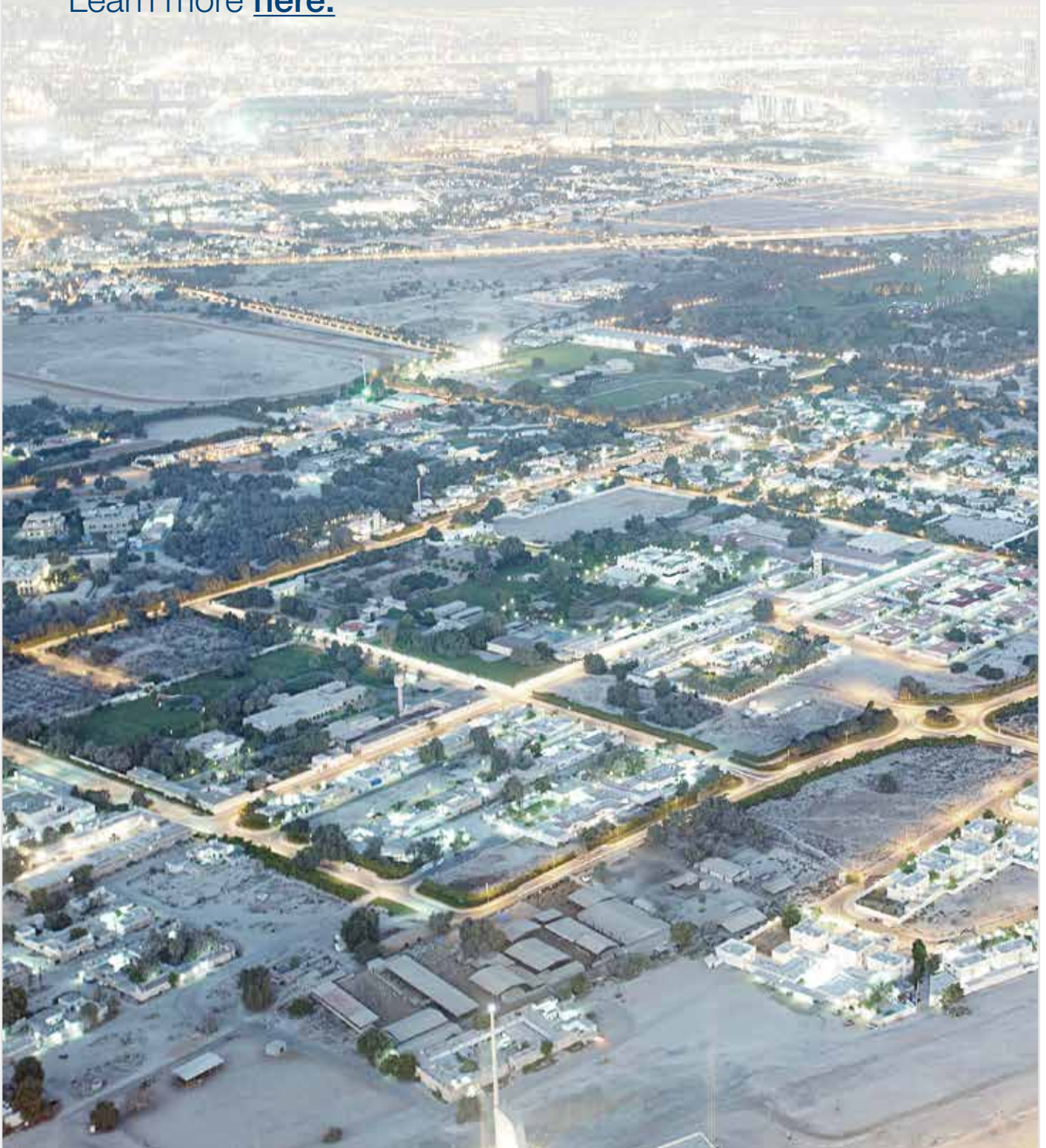
Applications and opportunities for energy storage

Critical processing – 20

ABB supply a power protection solution to a boutique semiconductor company

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power

**Perry Field**

General Manager (as of 2015)
GPL Power Conditioning
Power Protection

It gives me great pleasure to write this editorial for the final 2014 edition of Power.

From January 2015 I will be the general manager of the global product line for Power Conditioning. Power Conditioning is based in Napier, New Zealand, and as part of the ABB Power Protection product group, we are globally responsible for a range of innovative power conditioning products. I am delighted to be taking up this role and I'm looking forward to exploring opportunities to better serve our customers, together with the great team in Napier and the wider ABB community.

I'd like to take this opportunity to say a few words about my predecessor, John Penny. Many of you will have come to know

John through interaction with the Napier business and I think you would agree he has made a huge contribution. I would like to sincerely thank John for this and wish him well for the future.

In this edition of Power, we take a closer look at large data centers. The feature article introduces some of the technical trends for these facilities. Within ABB Power Protection, we have a wide range of products suitable for data centers and are continually developing products and features for this application. One such development is the PCS100 MV UPS, a high power medium voltage system. Other product features, such as hot swap modularity for the DPA range of UPSs, minimize downtime and allow your UPS system to simply grow with the facility's needs. Service is another aspect discussed in this issue, and we examine the benefits of infrared imaging.

Power conditioning also involves correcting issues such as poor power factor. Here we have an article about the PCS100 Reactive Power Conditioner (RPC). The PCS100 RPC is ideal for solving the "difficult" power factor problems which can cause issues within facilities. Recently, I joined a commissioning in Japan for a PCS100 RPC being applied to the semiconductor manufacturing process. As well as lowering the total kVA demand, correcting power factor also ensures the best possible voltage quality, in turn improving the quality of manufacturing.

We feature several customer

case studies for various power protection products. A boutique semiconductor manufacturing company in Singapore, was having issues with voltage sags. Here the PCS100 Active Voltage Conditioner (AVC) provided the ideal solution, as many of the world's top semiconductor manufacturers can attest.

The Conceptpower DPA UPS is also featured, with installations in Mexico and Bolivia, showing that the value proposition of the modular DPA UPS is recognized worldwide.

Finally, as we head into the holiday season in many parts of the world, I wish you and your family a safe and happy end to the year. At ABB Power Protection we'll use the holiday period to recharge our batteries and get ready for an exciting 2015.

Enjoy this final issue of Power for 2014.



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Big is beautiful

Data center power trends.

Data center designers are increasingly adopting the maxim that bigger is better. Driven to a large extent by the shift toward co-location, hyper-scale data centers are becoming more common. As centers have grown larger, they have also grown more generic and their product more of a commodity business.

“Because of the complexity of microgrids, most data centers are better off simply identifying a low-cost power source from the local utility.”

Today, data-buying decisions, once the required availability level is defined, basically come down to price, and the prime target in driving that price as low as possible is energy. Considering the amount of power consumed, and the fact that energy is typically the largest controllable cost, data center managers are eager to squeeze every possible percent out of their electricity cost.

Energy efficiency

In the quest to reduce energy consumption, uninterruptible power supply (UPS) systems are an area of intense interest, and new technology and operating procedures are showing promise.

Eco-mode is a UPS energy-saving feature whereby the load is supplied via a static bypass line. In the past, this solution has mostly gone unused because the cost-benefit equation has not been sufficient to warrant the increased risk. A normal double-conversion UPS converts the input AC to DC. The batteries are connected to the DC source to provide continuous charging, and then the DC is inverted back to AC to power the servers. Power loss occurs during those conversions. In eco-mode, the bypass path connects the input AC directly to the output AC.

“There are several reasons operators are more likely to use eco-mode today,” said Perry Field, General Manager for ABB Power Conditioning. “First is improved technology both in the UPS and in the servers they power. UPS technology has improved to a level where operators are more confident that, during a power event, the UPS will transparently compensate. On the server side, the built-in ride through capability is well proven, reducing operator concerns about protecting power-related events.”

Another factor is that power outages are less frequent in the typical hyper-center than in smaller facilities. Larger facilities tend to be connected to transmission-level mains, where long outages are infrequent.

In the past, the one to two percent energy savings delivered

by eco-mode were not worth the risk. But technology improvements have improved the risk profile and, in the ultra competitive hyper-center market, saving one percent in energy costs provides a desirable cost advantage.

Reusable energy

Often there is more talk than action in the area of reusable and renewable energy, but there is little doubt that both will become increasingly important sources of increased efficiency and reliability in the years ahead. Here, the mantra of “reduce, reuse, recycle” may be appropriate.

There are various strategies being considered to reduce the heat generated in a data center. One is the use of DC voltage to power servers. The AC-to-DC transformer in each server is a major heat generator, but by eliminating the transformer, you can greatly reduce the heat. Widespread adoption of this approach is unlikely in the short term. In the meantime, operators are looking for ways to reuse and recycle that heat.

While some data center construction occurs in relatively remote areas in order to take advantage of low land/space costs, other projects take the opposite approach, locating their centers in urban areas. In this scenario, the heat generated from the servers can be used to warm adjacent buildings. These centers also have the benefit of proximity to major data trunks.

Renewable energy

Many data center operators are closely investigating renewable energy. This offers the potential for lower-cost energy and provides an alternative to the grid in areas where reliability is an issue. Of course, renewables have their own reliability issues. The wind may not blow and the sun may not shine, or they may do so at times when power is not really needed.

“To realize the benefits of renewables while overcoming their limitations,” Perry explains, “data centers can rely on a microgrid approach that combines multiple resources such as the grid, diesel generation, and renewables. It is no simple



There are various strategies being considered to reduce the heat generated in a data center

task but it is being done successfully, mainly in remote communities or industrial facilities where grid-delivered power is particularly expensive or unreliable.”

Technology is available today to successfully address issues related to the shifting power flows that occur in microgrids. Energy storage converters can deliver power when needed and absorb power when the renewables produce more than is currently required.

“Because of the complexity of microgrids, most data centers are better off simply identifying a low-cost power source from the local utility,” Perry observes. “However, in places where there are constraints on power sources or that do not have access to reliable electricity, people are seriously investigating these alternatives. As technology evolves to further simplify microgrid management, you will see data centers increasingly embrace the concept.”

More medium voltage

Technology does not always scale up well. The low voltage (<480 V) systems used in data centers provide a good example. Enterprise-scale centers are well-suited to utilizing low voltage power. As centers grow, though, the drawbacks of low voltage begin to add inefficiency and increase both capital and operations costs.

The capital costs of a low voltage system are higher because they require large conductors, big switchboards, and multiple circuit breakers. Maintaining all these devices increases ongoing maintenance costs. Medium voltage systems, on the other hand, provide a more centralized approach. While a low voltage system may have 10 UPS units at a lower power rating, a medium voltage system may have only two or three.

“As the current in a medium voltage system is lower, the efficiency of the whole system is extremely high. Our medium voltage UPS products provide 99.5 percent efficiency compared to the very best double-conversion, low voltage UPS systems that are in the 96 to 97 percent range. The comfort level that operators have with traditional, low voltage

systems means that adoption of medium voltage topology is likely to be cautiously slow. However, as industry leaders begin to make the transition, the move to medium voltage is a trend that we expect will accelerate.”

Medium voltage systems will provide benefits in very large data centers, but the benefits can extend down to smaller installations in the 5 to 10 MW region as well.

Tracking trends

In many industries, trying to predict trends is difficult. But in the data center market, some trends are easily identified. One such trend is that, for the foreseeable future, more processing will be done in hyper-centers, and these massive warehouses of computing power will relentlessly seek solutions that reduce costs and give price advantages. Increased energy efficiency through new technology, including more advanced UPS systems and medium voltage topology, provides a promising path to greater efficiency.

“Manufacturers will continue to respond to customer demand for further technology improvements, leading to even greater enhancements in energy efficiency and power quality,” Perry predicts. “Technology advancements combined with the willingness of data center operators to explore new approaches to energy management, will drive continued operational innovation and efficiency.”

To find out more about ABB’s UPS offerings, visit:
www.abb.com/datacenters

PCS100 MV UPS

2,4,6 MVA



Designed for large manufacturing plants through to mega data centers, ABB's PCS100 Medium Voltage UPS is the solution for any high powered industry. With multi megawatt ratings, allows customers to choose the solution that best suits their applications.

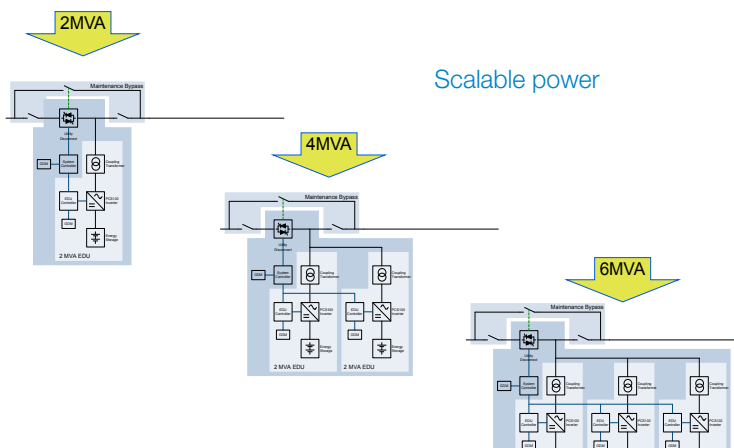


Advantages

- Complete power protection: When installed at medium voltage levels, the PCS100 MV UPS can be put in less crowded spaces away from target devices.
- Lowest total cost of ownership: The unparalleled efficiency of the PCS100 MV UPS, its minimized maintenance requirements and small system footprint minimize ownership costs. The fact that the energy storage and converter is at the low voltage level also greatly simplifies maintenance and reduces system costs.
- Retrofit possibilities: The PCS100 MV UPS has many retrofit possibilities that allow custom designs that suit applications in plants that are currently unprotected or where traditional rotary UPS solutions require replacement.

Scalable Solution 2,4,6 MVA

Add two MVA EDUs at a later date



Specifications

Technical details

Item	Value	
Nominal Voltage	6.6 kV	(to 15kV class stage 2)
Power Frequency Withstand	20 kV	
Basic impulse level (BIL)	60 kV	
Power	2, 4 & 6 MVA	(to 12 MVA stage 2)
Power factor (pf)	0.7 lag to 0.9 lead	
Autonomy (capacitors)	1 s	At 1.0 pf, valid for 15 years
Autonomy (batteries)	15 minutes	At full load
Event detection	<500 µs	
Transfer performance (under voltage)	Class 2	Per IEC 62040-3
Transfer performance (over voltage)	Class 1	Per IEC 62040-Comments 3
Maximum motor load	25%	Excludes motors on VSD
Efficiency	>99.5%	



Correcting power factor

Reactive power conditioning for commercial and industrial applications.



ABB's PCS100 Reactive Power Conditioner

ABB has a variety of power protection products and the PCS100 Reactive Power Conditioner (RPC) is an addition to this portfolio. Specifically designed for industrial and commercial applications, the PCS100 RPC is able to respond instantly to power quality events, while providing continuous reactive power correction.

Power problems can manifest themselves as power factor issues, inrush-generated sags, voltage imbalance or voltages outside regulatory requirements (a particular problem for direct online connected motors) and harmonics. These can result in financial penalties and costly electrical equipment malfunctions if left uncorrected. Although the primary role of the PCS100 RPC is to condition current by injecting reactive current to stabilize voltage, it can also provide a very cost-effective solution to other problems. Because the unit conditions the current drawn by the customer's load, it fits well with ABB's other products in the PCS100 family, such as the PCS100 UPS-I uninterruptible power supply (UPS) and the PCS100 Active Voltage Conditioner (AVC), which provide power supply to critical loads and condition voltage, respectively.

The PCS100 RPC is rated for applications from 100 kVAR to 2,000 kVAR and uses high-speed insulated-gate bipolar transistor (IGBT) inverter technology to control reactive power flow into the AC network. By injecting capacitive or reactive current at different frequencies and phase angles, the PCS100 RPC efficiently and reliably provides:

- Fast dynamic reactive power
- Unity power factor
- Correction of current imbalance
- Harmonic cancellation

The inverter technology that is employed means the compensation is stepless (unlike many other solutions), which minimizes disturbances and ensures seamless power conditioning.

PCS100 RPC technology

A complete range of cabinets for the PCS100 RPC is available, suitable for direct connection to typical low-voltage supplies (380 to 480 V). The devices are rated from 100 kVAR to several MVAR. Combined with the PCS100 UPS-I and the PCS100 AVC, the RPC can be applied to a wide range of situations, from computer room backup through to large data centers and complete industrial plant protection. The highly reliable modular redundant design means the system is scalable and can be easily expanded as power needs grow. In addition, if one of the power modules fails, the system will not trip, but will continue to operate at reduced capacity. Because the granularity is small, the manufacturer can achieve full redundancy at very low cost; this level of reliability at such low cost is unique in the industry.

Proven PCS100 solutions

A comprehensive power assurance package can be created by combining the ABB PCS100 RPC with an ABB PCS100 UPS-I.

This turnkey solution means that, if a power outage occurs, the PCS100 UPS-I will disconnect the load from the utility and supply the manufacturing line with full power for five minutes. Simultaneously, the PCS100 RPC will provide power factor control above 0.90.

In one particular application, where this solution was used to protect a critical polyimide film manufacturing line, the customer's expectations were that, should a power outage occur, the UPS-I would supply power to the load of 1,000 kVA. ABB's PCS100 UPS-I is able to go beyond that expectation and supply 1,050 kVA to protect the load should a shutdown occur.

The PCS100 UPS-I includes a high speed static switch, meaning that a faster transfer to stabilize the power flow will occur if an outage prevails. After further evaluations were undertaken, the company found that no other competing products could provide this level of protection. The final deciding factor related to system efficiency, as the manufacturer was able to save a large amount on air conditioning requirements, due to low heat loss from the PCS100 UPS-I. As well as an efficiency of 99 percent, the ABB PCS100 RPC has a small footprint, thus saving costly real estate.

The modular and scalable architecture of the ABB PCS100 RPC and its compatibility with the other members of the ABB power protection family, as well as its success in combating common industrial power problems, has resulted in significant interest being shown in power protection applications.

Download ABB's new PCS100 RPC brochure

Watch ABB's PCS100 RPC video

To find out more about ABB's power conditioning solutions:

Web: www.abb.com/pcs100-power-converters

Email: powerconditioning@abb.com



Downtime eliminated

Modular UPS (uninterruptable power supply) can prevent costly downtime in data centers.



Conceptpower DPA 500 (100 kW – 3 MW)

One of the defining differences between the 20th century and our 21st century world is that we're now spending a lot less time and money on repairing things; focusing instead on simply swapping out faulty devices.

In the 1950s and 60s, if your television stopped working, you called a TV repairman who would come to your house, tinker with the innards of your set and possibly even take the chassis back to his workshop for a few days. If your car stopped running, it might hang on a lift in the gas station's garage for days while a mechanic diagnosed and repaired the problem.

Today, nearly every home has several TV sets. If one in the living room goes bad, it can be replaced with a spare from the bedroom or an inexpensive new one. Car problems? The garage can diagnose the issue in minutes, then change out a circuit board or microchip and you're on your way.

We live in a modular world, one where it's often more expensive (in terms of dollars and lost time) to open up a device and repair its small components than simply to plug in a replacement. Data centers are no exception to this phenomenon, especially in the arena of uninterruptible power supply (UPS).

Downtime equates to mission failure for the most vital of data centers, so shutting down a portion of the center's operations for hours while waiting for a service technician to fix or replace a UPS is not usually an option.

Fortunately, technology has evolved to meet the data center industry's requirements for speedy, affordable UPS replacement through modular systems. Rather than the dedicated systems of the past that locked data centers into fixed amounts of power capacity – whether they ultimately needed that amount or not – new modular systems are extremely flexible. These modules can serve as standardized building blocks that can be easily moved around the data center as missions and power demands change. In the most advanced technology, each UPS module contains all the power distribution and energy storage components required for operation, so modules can be swapped out with no interruption to service.

As a result, UPS systems can now be built around a frame that contains multiple UPS devices. If one fails, the others take over without any interruption for repair. The faulty UPS can be removed and sent out to be fixed while the remaining devices provide protection. Or a new module can be plugged into the frame in 10 to 15 minutes.

Consequently, power protection systems can be built for existing needs and scaled up as the data center grows. That capability provides immense flexibility to data center designers and operators, enabling them to easily scale the data center up or down for the tier level of service that clients require.

For more information visit: www.abb.com/ups





Improving safety in data centers

Your window to safer operations.

Hot spots can lead to a catastrophic event in your data center. Hot spots in electrical equipment can mean unbalanced loads, harmonic in neutral connections, overloaded systems, loose or corroded connections due to vibrations or improper torque, insulation failures, wiring errors, or unspecified components. These hot spots show up in IR scans, allowing early detection of electrical connections and components that have degraded over time.



Loose or degraded connections could be lurking in your data center. New advances in thermal scanning port technology provide the protection you need.

Once a hot spot is detected, the next step is to eliminate the cause. To do so, protective covers need to be removed, risking a potential arc flash event. But the implementation of a Cyberex integrated IR port solution can provide many benefits. The Cyberex integrated IR port solution can pinpoint hot spots with non-invasive scanning, requiring no physical contact with the equipment. There is no need to plan for downtime, so disruption to your data center operations is prevented. The IR port solution identifies emerging dangers enabling preventive actions to be scheduled, improving overall reliability. This ensures workplace safety and eliminates the possibility of exposing employees and contractors to faulty equipment.

Ensuring the best for your data center

Cyberex offers superior reliability enhancement features, with state-of-the-art equipment and accurate analysis of IR scan results. In addition to this, the scan improves the reliability of mission critical equipment, facilitates identification of termination issues and allows live equipment to be serviced. Providing wide view coverage of bolted connections and standard processes backed by ANSI/NETA recommendations, ensures your data center is in expert hands.

Finally, each IR report includes a comprehensive full-featured report with an inventory of equipment, images and recommendations.

What are the benefits?

Loose or degraded connections could be lurking in your data center. New advances in thermal scanning port technology provide the protection you need. Compared to other solutions, the Cyberex IR port is a robust polymer-based solution with thicker material that can be tailored to meet your specifications. By implementing an IR port, technicians are protected from possible arc flashes. This maintains reliability by allowing early and safe detection of potential load drop. Furthermore, time required to remove the panels is eliminated, enhancing serviceability. Early warning detection for planned inspections helps increase efficiency for your data center, ensuring operational excellence.

For further information, visit:

tnbpowersolutions.com/ir_port



Optimal energy storage

Applications and opportunities for new generation energy storage.

New storage technologies and power electronics create opportunities in power protection, renewables, integration and grid support.

Storing electrical energy cheaply and efficiently has always been a vital goal for designers of cars, buses, uninterruptible power supplies, and the alternative energy community. Historically, lead acid batteries have dominated the energy storage market. They are cheap and effective but have many limitations. New generation batteries, such as Lithium-Ion and ultra capacitor energy storage technologies, are providing a breakthrough in cost-effectiveness and efficiency.

Energy can be stored in many ways, such as potential energy in water dams (pumped storage), kinetic energy in flywheels, as heat, chemically and as static charge. Much of the world now runs on electric power and many energy storage challenges involve efficiently and cost effectively converting electrical energy into stored energy. Stored energy must also be converted back to the current and voltage required by the particular load. This is where batteries and ultra capacitors become an attractive option, as they can store energy in the form of direct current (DC). When partnered with power electronics, this DC energy can be converted to the alternating current (AC) that most loads require.

Historically, battery technology has been dominated by lead acid battery designs. In recent decades, significant advances in lead acid battery design have occurred, most particularly in Valve Regulated Sealed Lead Acid (VRLA) designs. These batteries have become relatively cheap and have become the technology of choice for most uninterruptible power supply and other static and dynamic energy storage applications. Relatively new advances, such as thin plate pure lead designs, have increased power delivery capability and energy density, and have become attractive for many short discharge time applications, typically for one to 15 minutes.

Despite all of the advances in lead acid battery technology and their suitability for many applications, they do have drawbacks, such as:

- Real application lifetimes are relatively short (typically three to 10 years, greatly reduced in environments with elevated temperatures)
- Reliability issues for higher voltage strings with many cells in series. Cell failure impacts on performance and can damage the complete string if not detected and corrected quickly
- Weight, as lead is a very heavy element
- Limited deep cycle performance capability
- High maintenance costs, as regular manual checking of batteries, or even automated checking, results in a relatively high ongoing cost of ownership
- Environmental concerns with lead and associated recycling costs

Despite all of these limitations, VRLA batteries continue to offer low initial capital costs and so will continue to be the technology of choice for most commodity static storage applications, such as UPSs, in the foreseeable future.

The huge commercial push for cost-effective electric cars has seen large-scale investment in new generation battery designs. Many technologies have shown potential but, at this point variations variants of Lithium-Ion technology are the most promising. With their light weight, good deep cycle performance, good acceptance and high rate discharge performance, and relatively high tolerance to elevated temperature, they tick many of the boxes in areas where VRLA batteries struggle. However, cost continues to be a challenge along with safety – particularly the risk of fire. Fortunately, the scale of demand for Lithium-Ion batteries, due to vehicle manufacture, continues to push costs down and improve safety performance. For other applications, such as demanding static and dynamic energy storage in the one minute to a few hours range, Lithium-Ion batteries are now a very promising technology.

Other interesting battery technologies are also appearing, such as flow batteries. Energy is stored in tanks of electrolyte and passes through cells to charge and discharge.



LS Mtron ultra capacitor module installed in PCS100 UPS-I Industrial UPSs



A PCS100 UPS-I installation with ultra capacitor storage in a semiconductor facility

Applications also exist for high power storage in the sub one minute autonomy range, and this is where ultra capacitors come into their own. Rather than storing energy chemically, ultra capacitors use static charge more directly. The advantage is very high peak power capability and round trip efficiency (minimal power loss in the charge/discharge cycle). These capacitors are now available in modular format, including the necessary voltage balancing and protection circuitry, as found in the LS Mtron battery shown in the photo above.

What are the opportunities?

Reduced Autonomy times

UPSs make extensive use of batteries, but the loads and requirements are progressively changing over time. A primary application for larger scale UPSs is within data centers, and the view on what is an acceptable battery autonomy time has changed dramatically. Historically, data center operators typically insisted on autonomy times at UPS full load operation of 30 minutes to one hour. As actual data center loads were much lower than this (typically half) and hold up depended on the real power loading on the batteries, real autonomies were very long. This would allow operators to identify a problem, investigate, and then shut down servers in a timely manner.

Today, data center operators typically expect much shorter autonomies because:

- If back-up diesel generators do not start first or second try, they are unlikely to be started within any reasonable autonomy time
- Applications such as cloud computing and redundant computing configurations have reduced the impact of unplanned power outages

- Cost pressures and space constraints have increased, so there is pressure to reduce battery size
- The real costs of battery ownership and maintenance have become clear and larger battery systems have a larger ongoing cost of ownership
- Many tier three and four data centers have dual redundant reticulated uninterruptible power, with each UPS loaded at significantly less than half loading – often around 25 percent. This means extended full load autonomy specifications are unnecessary

These factors have meant significant cost and space can be saved by selecting a battery designed to supply high levels of power efficiently, typically with a low internal resistance. VRLA pure lead batteries meet this requirement and are cost effective but, as already discussed, there are drawbacks. New generation Lithium-Ion batteries, although having a higher capital cost, offer a much better power density, operational life and tolerance to increased ambient temperature. The increased temperature capability can allow for significant savings in air-conditioning capital and ongoing costs.

Very large mega data centers or large industrial applications, such as semiconductor fabrication plants, are often closely connected to the high voltage transmission grid with high reliability. The more common problems, therefore, are very short outages, such as switching changeovers between redundant feds or very deep voltage sags caused by network faults and weather events. In these cases, autonomies in the order of seconds can be practical, and the reliable and power-dense ultra capacitor technology comes into its own.

ABB have supplied many hundreds of megawatts of ultra capacitor backed industrial grade UPSs with full load



PCS100 ESS successfully applied with a zinc bromide flow battery at Redflow in Australia

autonomies of two to three seconds, and the trend towards this technology is increasing.

Grid Support

There is increasing demand for battery energy storage systems (BESS) for electricity grid support applications. Electrical power can be stored and then supplied back to the grid as needed to support grid frequency, integrate renewables, and offset peak demand or shift demand from day to night. ABB's PCS100 Energy Storage System converters have been widely applied to interface the AC electricity grid to DC Lithium-Ion battery strings.

Not only can ABB's PCS100 ESS product shift real and reactive power to and from the grid on demand, but advanced features allow the power electronic grid interface to look like a virtual generator – much like other more conventional rotating electrical generators as found in power stations. The system can support the grid when connected and even detect grid loss, disconnect from the grid and then continue to support any local loads in island mode. This offers huge potential for advanced micro-grid development, including the integration of UPS functionality.

In fact there appears to be a convergence of UPS function and grid support function for many applications. Some customers want their UPSs to be able to support the grid with load shedding features and in some grid support applications a level of UPS function is requested. With advances in converter technology, along with advanced energy storage, all of these outcomes become possible.

New energy storage technology and the development of advanced power electronic converters allow significant

advances in power protection, grid support and renewable power integration.

To find out more about ABB's power conditioning solutions:

Web: www.abb.com/pcs100-power-converters

Email: powerconditioning@abb.com



Critical processes

Supplying a power protection solution to a boutique semiconductor company.

ABB has supplied a PCS100 Active Voltage Conditioner (AVC) to a boutique wafer fabrication plant in Singapore. Voltage sags over the past two years, created by rotary frequency converters, compromised the manufacturing process. ABB's power protection technology will protect the power supply of these converters, improving productivity and eliminating wasted resources.

Protecting critical processes

Semiconductor facilities require super critical protection of their sensitive tooling and machinery. If a semiconductor production facility loses power for a fraction of a second, production losses are enormous. The company's boutique fabrication plant needed to operate in a conditioned environment. The wafer processing equipment in the facility is sensitive and uses expensive tooling that must operate within very strict specifications.

The equipment to produce the wafers is imported from the US and requires a 60 Hz power source to operate. This 60 Hz power is supplied by the plant's rotary frequency converters which take in a 50 Hz power source from the utility grid. Their manufacturing process was frequently disrupted by voltage sags created by these frequency converters. Because a second of downtime can cost more than half a million dollars, it was important that these voltage sags were addressed immediately. The tight delivery schedules to supply end-customers cannot be disturbed by power failures, so prevention of production stops, and thus high availability of equipment, is crucial.

ABB's PCS100 AVC will supply a seamless power supply by providing power protection to the rotary frequency converters. With an operating efficiency exceeding 98 percent and a small footprint in design, the PCS100 AVC provides a reliable, space-saving solution. Because the PCS100 AVC requires no energy storage, there is a lower cost of ownership.

ABB's globally-proven power protection solutions, enabled the company to rely on the PCS100 AVC system. After the factory acceptance test and with other wafer processing plants in Singapore adopting this solution, the company was confident that ABB could help. The small footprint the PCS100 AVC offered also helped in the decision-making process.

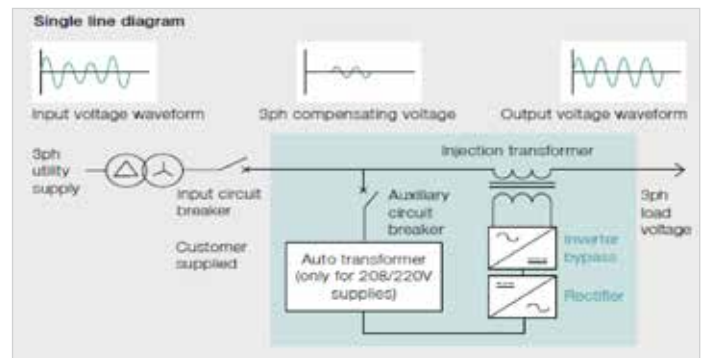
Assessing the core technology

The PCS100 AVC consists of two converter stages which are not on the current path between the load and the utility. Instead, the corrective voltage injection is achieved by means of a transformer winding between the utility and the critical load. This configuration reduces the risk of negative impacts on the load.

Furthermore, the PCS100 AVC contains a redundant bypass system that disconnects the AVC from the customer's network under some internal fault conditions on the customer side. In more than 13 years of plant operation and with an installed capacity of more than 900 MVA, the platform's bypass system has never failed. Many leading global semiconductor manufacturers with particularly high demands on plant availability rely on this technology.

The PCS100 AVC is available with ratings between 150 kVA and 2.4 MVA, either as a switchgear cabinet for low-voltage networks or containerized for medium voltage applications. It offers online voltage control precise to within a fraction of a second, high scalability in terms of voltage and power level, a proven and dependable converter platform, sophisticated control software and an efficiency of 98 to 99 percent.

The PCS100 AVC ensures quick and full correction of three-phase voltage sags down to 70 percent of the nominal voltage and of single-phase voltage sags down to 55 percent of the



The PCS100 AVC consists of two converter stages, which are not connected in the current path between the load and the utility

nominal voltage for 30 seconds. In case of deeper voltage sags, it undertakes a partial correction, which will often prevent load shedding. In addition, all models are able to continuously correct voltage fluctuations of ± 10 percent of the mains voltage and even remove imbalances from the supply voltage.

High efficiency and reduced maintenance costs

With a typical efficiency of 98 to 99 percent, the PCS100 AVC offers considerable energy-savings potential compared with traditional solutions. In addition, most of the maintenance needed by similar voltage regulators is associated with the storage medium, particularly the batteries. This does not apply to the PCS100 AVC.

[Download](#) ABB's PCS100 AVC brochure

[Watch](#) ABB's PCS100 AVC video

To find out more about ABB's power conditioning solutions:

Web: www.abb.com/pcs100-power-converters

Email: powerconditioning@abb.com



Reliable IT protection



Every financial department needs a stable IT base, especially when employee salary payments are dependent on it. So when the uninterruptible power supply (UPS) that the Mexican Secretaría de Finanzas del Distrito Federal was using became inadequate, they naturally wanted to replace it with a more advanced and reliable UPS.

They also had several important criteria: time, redundancy, space and cost. ABB's representatives, ALPE (Asesoría Logística Proyectos y Equipo S.A. de C.V.), were able to explain how ABB's DPA (Decentralized Parallel Architecture) was the best choice for the government department. Benjamín Alonso of ALPE, explains, "Our customer wanted to replace an old 30 kVA UPS because it no longer fulfilled their power requirements. They needed 60 kW – and redundancy. The Conceptpower DPA 208S not only supplied the necessary power and redundancy, but the modular architecture means that modules can be added as power requirements increase, up to 100 kW, 125 kVA, or 80 kW, 100 kVA, while still maintaining the availability and redundancy profile. If needed, they can also parallel another frame for more power."

This UPS is ideal in situations, like this one, where real estate is limited. The customer was pleased with the extra room they gained. When extra modules are added to the rack, no extra floor space is taken up.

Benjamin goes on, "The Conceptpower DPA 208S was cheaper to buy and run, and occupied less space than the parallel system of 80 kVA, 72 kW that other companies were offering. The customer also liked the easy installation and maintenance, assuring continuity of their critical process."

The Conceptpower DPA 208S, with four modules of 20 kW, 25 kVA (for a total system of 100 kVA) and battery bank, had to be installed at night. Installation could have been difficult as it was generally a challenge to maneuver equipment into the room, but the DPA provided for the easy removal of the modules to allow the frame to be carried in. The modules were then simply reinserted in situ.

The Conceptpower DPA 208S was the only product that assured full redundancy in all UPS modules, including batteries. The customer had confidence in the ABB brand and the quality of the Swiss-manufactured UPS.

For more information visit: www.abb.com/ups



Communication support



Conceptpower DPA 250 in Bolivia.

ABB's partners in Bolivia, Amper SRL, have supplied two Conceptpower DPA 250 units, including five 50 kVA modules each, to one of the country's major telecommunication companies, Entel SA.

Space, redundancy, reliability and future expansion were the main factors taken into account by the client and these are exactly the salient features of the DPA Conceptpower UPS. Ariel Lara, of Amper, says, "ABB's modular architecture was key to winning this order. The customer really needed a redundant solution that could fit into a small space and the ABB Conceptpower DPA UPS fitted the bill exactly.

"It also has a high reliability and the fact that you can simply hot-swap modules makes it really easy to maintain. The client may want to expand the power capability of the UPS in the future, so the fact that they can simply add more modules to the Conceptpower DPA UPS without redesigning or requiring more space was a big plus."

The system is now installed and successfully commissioned.

For more information visit: www.abb.com/ups



Protected



Power protection

08. Industrial power protection

Single conversion UPS for industrial protection

10. High density power distribution

Deploying effective power protection in data centers

15. Power health

ABB DPA UPScale ST 200 UPS for medical laboratory in Switzerland

16. Sensing perfection

Protecting the most sensitive equipment for high-end technology

Powering ahead



Power protection

06. Dairy goodness

Providing a power protection solution to Fonterra

08. Processing and packaging

Quality solutions for the food and beverage industry

11. PowerWave 33 Series 3

Power protection for small and medium sized organizations

23. Reliable UPS support

Power protection for an Indonesian data center



ABB modular UPS. Always reliable and always available.



Availability is everything when it comes to a UPS, so ABB's modular UPS architecture is designed to make sure that power is always available when you need it. Each high-reliability, standardized module is self-contained and can be online-swapped at any time, so nothing ever has to be switched off – making routine maintenance safe and easy. And if one module gets into trouble, the others take over the load. Visit www.abb.com/ups

Power and productivity
for a better world™

