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Laura Ortiz
Product Manager
Commercial and Industrial UPS Systems
NAM

Dear all,

On behalf of the Product Management team, I’m very excited to welcome you to this edition of Power magazine. Over the last seven years I have held several roles within Thomas & Betts and now ABB. From internal manufacturing support as a cost reduction engineer, to supporting primary sales initiatives as application engineer. And now serving as product manager for commercial and industrial UPS systems in North America, as well as product management liaison support for all the Americas.

As we approach the last quarter of 2017, I want to take a moment to share with you our global product initiative that is centric to ABB’s value pair customer focus and quality. Building upon decades of experience in the data center industry, the power solutions business in Richmond, VA has brought together proven products, systems and solutions focused on customer needs, both national and global. Our primary focus is to continue expanding the North American market awareness for the innovative decentralized parallel architecture (DPA) UPS design with the continuous development of product variations that support UL applications that are integrated within the existing IEC infrastructure. Our global engineering teams worked collaboratively to advance three key product launches within an 18-month period, providing an expanded UL market footprint, that drives our goal to meet next-level customer demand.

The global power protection team has synergized our market support with integrated engineering, sales and market management strategies to develop safe, reliable critical power protection products and services that support future market needs. With data centers being a primary focus, we monitor market trends to understand application criticality and how it drives customer’s infrastructure needs. Unprecedented growth is happening on both sides of the spectrum, from the “hyper-scale” to “edge” data centers, where reducing costs and providing product advantages will be key to our success.

In this edition, we are pleased to introduce ABB’s new front access Cyberex® SuperSwitch®4 digital static transfer switch (DSTS) to ABB’s comprehensive power protection lineup. Building on 40 years of experience in designing and manufacturing DSTS systems, the new SuperSwitch®4 front access design will continue to redefine power reliability and safety for data centers. The new design launches with 200 A, 250 A, and 400 A systems requiring front access only for installation, operation, and maintenance, showcasing improved serviceability, and best in class performance.

Highlighted in this issue are several outstanding articles that define the strength of our power conversion and conditioning systems. Early 2017, ABB Power Protection introduced its revolutionary ZISC technology in the next generation of medium voltage (MV) uninterruptible power supply (UPS) based on the PCS120 converter platform. The high-performance, flexible system expands ABB’s MV UPS Portfolio, supplying critical load industries with high-quality power, reliability and efficiency. In this issue, we recap and detail features and benefits of this ground-breaking MV UPS and ZISC architecture.

The topic of critical elastic infrastructure solutions rounds out this issue of "power." In a comprehensive white paper, we introduce a new functionality called Xtra VFI. Xtra VFI allows the electrical power distribution system in a data center to be an elastic infrastructure that is capable of optimizing the energy efficiency level by dynamically changing, in real time, the UPS power consumption depending on the actual loading level. Basic operating principles, set-up and Xtra VFI features are also illustrated in this paper.

We transition seamlessly from technological expertise to commitment and partnership. Read the article herein on page 19 how ABB has been chosen by Serverius, one of the largest data center providers in the Netherlands, to modernize its data center, delivering greater efficiency, reliability and quality. Central this data center build out is ABB’s ‘TriLine’ distribution system, a proven solution that combines reliability and quality with safety. The system will be combined with numerous redundant DPA 500 UPS systems, thus optimizing the availability of the power supply.

Enjoy this issue of power
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ABB launches front access Cyberex® SuperSwitch® 4 digital static transfer switch

208 V and 480 V SuperSwitch® 4 digital static transfer switches (DSTS) offer improved data center power quality detection, reliability, and serviceability

ABB has improved upon the Cyberex® SuperSwitch® 4 DSTS product line with new designs for 200 A, 250 A, and 400 A requiring front access only for installation, operation, and maintenance. Building on 40 years of experience in designing and manufacturing DSTS systems, the new front access SuperSwitch® 4 designs will continue to redefine power reliability and safety for data centers with its user-friendly interface, improved serviceability, and best in class performance.

The front access SuperSwitch® 4 models perfectly balance both safety and accessibility concerns with further compartmentalization between the input/output connections, molded case switches, and logic components, while ensuring installation can be conducted via the front of the unit only. Preserving its innovative 10.4” LED color touch screen display, intuitive software-guided bypass features and externally accessible customer USB connection, the new front access SuperSwitch® 4 models also include an isolated UIB compartment for customer connections that is centrally located at the top of the unit. This can be accessed either from the front or the top. By eliminating the side clearance requirement for installation or thermal scanning of breaker connections, the front access SuperSwitch® 4 design also effectively reduces the required floor space by 30 percent, thus allowing customers the ability to fully optimize the usage of valuable white space.

The SuperSwitch® 4 is designed with a ‘true’ fault-tolerant architecture, ensuring there is truly no single point of failure by utilizing patented transfer algorithms and robust electrical components. It boasts improved power quality detection that is immune to harmonics and load imbalance between the phases. In applications with downstream transformers, the SuperSwitch® 4 limits potential high transient inrush currents using state of the art digital signal processors and a newly developed, algorithm called Real Time Flux Control™ for dynamic inrush restraint (DIR). The results of this innovative approach are out of phase transfers up to 2 percent faster and inrush currents that are 40 percent lower than the SuperSwitch® 3. This intelligent proprietary technology ensures performance that exceeds CBEMA and ITIC standards, regardless of phase drift between sources.

The Cyberex® SuperSwitch® 4 is part of ABB’s broad range of products and integrated solutions that ensure data centers operate with optimum reliability and efficiency. From power distribution systems to enterprise management and grid connections, ABB provides savings in installation, energy, space and maintenance.
Power Solutions

Watch our product video showcase

The Cyberex SuperSwitch®4, 200A–1200A, digital static transfer switch redefines reliability

The Cyberex SuperSwitch®4 is the cornerstone of redundant power for a wide range of applications including data centers, hospitals, semiconductor manufacturing and other installations where continuous power is critical to a facility’s mission. Engineered to protect critical loads in both commercial and industrial environments, these switches use the industry leading Real Time Flux Control™ for Dynamic Inrush Restraint transfer algorithm to transfer power between any two sources of power, including any combination of utility, UPS and generators.

Conceptpower DPA 500 480V UPS; a compact 300kW footprint designed with scalability and flexibility

The Conceptpower DPA 500 480 V UL UPS is part of ABB’s broad range of products and integrated solutions that ensure data centers and other IT infrastructure applications operate with optimum reliability and efficiency. In response to customer demand, it is now offered in a 300 kW cabinet design that provides a lower initial investment cost and reduced footprint. Systems include three 100 kW module sets within each UPS cabinet; up to four cabinets can be configured in parallel for up to 1.2 MW, allowing for improved scalability and flexibility.

ABB expands the 480 V Conceptpower DPA 500 with an optimized 300 kW solution

Watch video: Link

Conceptpower DPA 500 480 V UPS; a right-sized 300 kW modular solution designed for the UL market

Watch video: Link
ABB technology helps semiconductor manufacturer improve productivity

ABB’s PCS100 AVC-40 power protection system supports production increases

ABB technology is helping one of the world’s largest memory chipmakers and semiconductor companies to increase productivity on key lines. The facility is based in South Korea and has placed a 12 million dollar order for ABB’s PCS100 AVC-40 power protection systems to provide higher protection for their semiconductor wafer production lines from voltage disturbances.

The Korean electronics giant supplies global tech brands with the processing power for desktops, laptops, tablets, smartphones and a growing number of digital devices. This latest order is for four 1800 kVA active voltage conditioners (AVCs) and around 74 of ABB’s 900 kVA systems.

The company’s spokesperson said: “As the world’s top tier semiconductor supplier, productivity and quality is essential to our performance. This latest order continues our strong technical partnership with ABB. ABB’s power protection systems support key manufacturing processes, ensuring our production delivers optimum performance at all times.”

Sang-Won Ji, Product Marketing Manager for ABB's Power Protection business, said: “The world’s leading manufacturers trust ABB with their power and productivity. ABB’s PCS100 AVC-40 power protection system helps keep production of semiconductor wafers running smoothly at the facility by ensuring key processes receive a continuous, regulated supply of voltage, even when the utility electrical infrastructure is stressed, unstable or becomes unreliable.”

Electronic control systems are the cornerstone of efficient, modern industrial processes. The quality of the power supplied to a facility’s instruments, sensors, relays, actuators and electric motors has a direct effect on their performance and reliability. The knock-on effects can be significant with lost labour, material waste and excessive energy costs as costly back-up systems, such as diesel generators, come online.
ABB’s PCS100 AVC-40 provides fast, accurate voltage regulation. The system enables facilities to streamline their operations, optimizing their resource and improving the return on their operational investment. The PCS100 AVC-40 also allows factories to use utility power, instead of more expensive on-site generators.

Sang-Won Ji added: “ABB’s PCS100 AVCs operate at efficiencies of more than 98 percent – the highest in the industry – significantly improving reliability. With our PCS100 AVCs protecting wafer fabrication lines against power outages, the facility will benefit from lower maintenance costs, protection against power sags and swells and continuous voltage regulation.”

ABB’s innovative PCS100 AVC-40 is a three-phase low voltage system that requires no separate energy storage. To make up the correction voltage, the system draws the additional current required from the utility supply. Its robust converter platform uses sophisticated control software to perform full range voltage corrections in just 20 milliseconds.

To find out more about ABB’s power protection solutions:
Web: www.abb.com/ups
Email: powerconditioning@abb.com
Multi-megawatt power protection at medium voltage

2017 marks the introduction of ABB’s revolutionary ZISC technology: a next generation of medium voltage (MV) uninterruptible power supply (UPS) based on the PCS120 converter platform. The high-performance, flexible system expands ABB’s MV UPS Portfolio, supplying critical load industries with high-quality power, reliability and efficiency.

The rapid rise of digital data and digital-based device use in the technology sector over the last decade is transforming modern business and society. The need for real-time, reliable data and digital device penetration is unprecedented. The expansion ranges from customer-driven technologies such as the internet of things and personal smart devices, to big data driven analytics, and data-dependent businesses such as financial institutions and governmental security agencies.

Propelling this drive for transformation is the development of extensive infrastructure and ever-increasing investments in electronics manufacturing facilities and enormous data centers. These facilities have been highly impacted by economies of scale, pushing single locations to grow even larger like hyper-scale data centers with a correspondingly higher power demand – often well into the tens of megawatts.

These large-scale facilities rely on a power supply quality much better than a utility can provide, as dollar losses for downtime in these critical facilities are simply not tolerable. This is valid not only for data centers and semi-conductor factories, but also for other critical load industries such as pharmaceutical, chemical, and the food and beverage sectors.

Data centers strive to lower costs and pass on savings to their customers. Benchmarking standards such as PUE (power usage effectiveness) and operating cost analyses are the primary factors used by clients to determine which data center should receive contracts. Because these high tech facilities are characterized by enormous power demands in a single location, the absolute requirement of maximum reliability and optimum efficiency is paramount to keep these critical load industries competitive.

Data gathered from data center research, for example, specify that the overall downtime cost for a power supply interruption is around $5.600 per minute. With power interruptions lasting on average 90 minutes, the cost of a single downtime event can be well over half a million dollars. Clearly, financial losses of this magnitude are undesirable. To mitigate the possibility of such incidents, critical load industries require an extremely reliable power supply as well as robust power distribution and power protection designs.

An additional technical challenge is to provide a flexible solution which reconciles the abovementioned need for an ultra-reliable system design with the cost-cutting requirements for enhanced efficiency and minimal operating costs. For these reasons, a medium-voltage power protection and power distribution solution combined with power conversion and storage at low voltage would be the ultimate solution for data centers and other critical load industries.

ABB prides itself on being able to find optimal product solutions for customers’ power needs. By creating the PCS120 MV UPS, which is compatible with a variety of configurations especially the tested fault-tolerant ring bus configuration, ABB does just that.

ABB’s PCS120 MV UPS adds needed flexibility by providing a static alternative to fit the ring bus arrangement resulting in a highly reliable and efficient solution /1.

/1 The ZISC technology in a ring bus arrangement allows fault tolerant, redundant and robust power protection design.
Power protection at medium voltage
Providing power protection at medium voltage yields multiple advantages. Topping the list is the ability to simplify the design of power distribution, in which lower switchgear, transformer and cable counts are needed. Thereby making the system much easier to maintain, manage and supervise. The lower current requirements at medium voltage with an equivalent power demand make this configuration the most efficient system possible. In addition, heating losses are reduced and capital expenditures can be minimized.

Because the typical constraining factor of large low voltage facilities is the current limit of LV switchgear and bus bars, the MV design solves this constraint by allowing larger blocks of power to be provided from a single location. It also enables smarter use of whitespace, since a MV UPS can be placed on less expensive real estate located further away from the loads, such as electric rooms and substations.

The power distribution system’s overall reliability benefits greatly from being operated at medium voltage because less infrastructure equipment such as switchgears are required. Studies also show that the individual reliability of MV devices are significantly greater than the reliability of their low voltage counterparts.

ABB’s MV power protection portfolio
To address the need for MV power protection, ABB introduced the PCS100 MV UPS in 2014. This product solution with a single conversion topology is scalable up to 6 MVA and voltages up to 6.6 kV. As a result of its high efficiency the product has been quickly established in the market.

Following the successful operation of the first units, ABB was immediately challenged by customer demand to provide other possible MV power protection solutions. ABB took up the gauntlet to meet customers’ needs. This meant developing an approach to include multiple voltage levels – for even larger amounts of power – and the ability of continuous power conditioning in lieu of the industry standard standby topology.

ABB’s 125-year history of innovation at the forefront of technology development, provided the framework for ABB engineers to react rapidly. ABB’s answer was to create a new ground-breaking MV UPS design, the ZISC (impedance isolated static conversion) architecture, to satisfy clients’ requirements.

PCS120 MV UPS and the ZISC architecture
The ZISC architecture introduced in 2017 is a new topology for the static MV power protection market. The ZISC architecture is based on an isolating line reactor coupled with the new high-performance ABB PCS120 power converters /2. By continuously controlling the voltage angle across the reactor, the inverters are able to control the real and reactive power from the utility to the load, without cycling the energy storage. At the same time the PCS120 converters are continuously conditioning and filtering any utility disturbances like harmonics and voltage imbalances, as well as providing reactive current support to the critical loads /3. This operating mode is known as power conditioning mode. If the utility power is no longer available, the PCS120 MV UPS opens its input breaker and seamlessly transfers the load to the energy storage, operating now in independent mode /4. This robust design concept thereby results in reliable power protection as well as continuous voltage conditioning, thus providing the load with prime power supply at all times.
ABB’s ZISC topology backed by the PCS120 converter technology achieves efficiencies of up to 98 percent, making this system top of the class and therefore significantly better than the segment incumbent rotary UPS system.

“Everything should be made as simple as possible, but not simpler.” – Albert Einstein

The beauty of the ZISC design lies in its duet of simplicity and robustness. The only equipment kept at medium voltage are the isolating line reactor and the coupling transformer. This enables the ZISC technology to be easily adapted to multiple voltage levels and power requirements. Paralleling is also easily performed, achieving power ratings in the range of over 40 MVA under different configurations.

By having the power conversion and energy storage at low voltage our customers maintain the familiar LV experience of functionality, maintainability and, most significantly, the modularity of an LV system like the PCS120 converter platform.

The PCS120 converter platform

The PCS120 converter platform, was one of the major facilitators of the ZISC technology. Defined by double the power density of its predecessor, the PCS100, the PCS120 relies on the same modular approach. The PCS120 converter platform is ABB’s answer to innovative design in power electronics /5.

From a hardware perspective, the modular approach of the design allows unparalleled serviceability and redundancy, while maximizing uptime. For instance, in the unlikely event of a module failure, the system isolates the module and continues to run with marginally reduced output power capability. At the same time, the smart control delivers a notification of the event to the supervisory system so that maintenance technicians can schedule the next site visit at their convenience. Automatic smart firmware management tools and a new slide-in modular design ensure our customers that the product has peak maintainability as well as painless spare part management.

One ABB

In addition to the PCS120 MV UPS system, ABB’s global portfolio of products also includes the Unigear Digital MV switchgear as well as ABB’s own digital protection relays. The digital IEC 61850 integration between the PCS120 MV UPS and the switchgear provides added reliability with distributed control capabilities. The comprehensive in-house package is designed for a seamless connection to the ABB Ability™ platform.

Moreover, ABB’s unified corporate structure, with local organizations across the world, provides customer support as well as dedicated project management teams to make sure project deliverables and schedules are kept.

The ‘One ABB’ solution offers ABB’s MV power protection customers a one-stop-shop with an array of excellent products as exemplified by the ZISC architecture and PCS120 MV UPS as well as the previously described services – thereby following the ABB philosophy of meeting customer demands in a rapidly developing and competitive market.

Author

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/5 The PCS120 converter platform with 6 power modules per cabinet and built-in system redundancies.

/6 PCS120 MV UPS new digital interface with extensive event analysis capability and pro-active serviceability.
Elastic data center infrastructure

Maximizing energy efficiency across all operating conditions with no uptime compromise. The Xtra VFI case.

Introduction

The quantity of data in our society is growing exponentially. Social media, e-commerce, Industry 4.0, business transactions, leisure, public administration and social security are just some of the aspects of modern life that generate a torrent of terabytes around the globe each and every day. This deluge of data has to be stored in a safe and rapid way, and has to be retrievable just as rapidly - 24/7 and 365 days a year - so it can be utilized in one of the many different applications upon which our day-to-day life depends.

What happens in the space of one minute in this world of data is truly astonishing: 16 million text messages and 156 million e-mails are sent, over $750,000 spent online, more than 3.5 million terms searched on Google, 450,000 tweets exchanged - and these represent just a tiny fraction of the many thousand transaction and interaction types hosted by the Web. As the population continues to grow in number and wealth, and as the number of ways in which data is used multiplies, so too will this ocean of data.

Our participation in this data world is often unconscious but, nevertheless, we are experiencing the beginning of a data era and the participation of each and every individual in this new era contributes to its further development, progress and shaping.

Fundamental information technologies such as virtualization or cloud services enable improved utilization of the existing infrastructure so that increasing data traffic demand can be managed better. Nevertheless, the exponential growth of data volumes forces us also to build new data center infrastructures.

Whether we are talking about telecom data center spaces, enterprise solutions, co-locations or cloud/business services providers (the latter typically being a hyper-scale environment), all data centers spaces and operators have a set of common requirements, the most important being:

- **Business continuity and zero downtime.** All systems have to be always up and running, and whatever happens on the infrastructure side, load-drops are not an option. This is to guarantee safe data transaction, storage and recovery.

- **Reduction of the investment and operating costs through higher energy efficiency.** Better efficiency reduces energy losses and operational costs, and at the same time eliminates the capital investment that would be needed to purchase higher-performance temperature conditioning systems (which heavily impact upfront investments).

This technical paper introduces a new functionality, called Xtra VFI. Xtra VFI allows the electrical power distribution system in a data center to be an elastic infrastructure that is capable of optimizing the energy efficiency level by dynamically changing, in real time, the UPS power consumption depending on the actual loading level. This is done without compromising the data center’s uptime.

Xtra VFI

In all typical Tier III or Tier IV data center applications in which the power to the load is secured through redundant feeder configurations, or in all those data center environments where the capacity is increased over time, or, more generally, in all those applications where the loading condition may vary

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**Fig 1: Typical Tier IV data center power infrastructure**
during the day/week/month, the UPS system actual loading condition might range from 10 percent to 50 percent of the nominal installed power. As a consequence, the UPS system is operated in the region where the operating efficiency is lowest.

In order to boost the UPS system electrical efficiency to higher values, the XTRA VFI function dynamically adapts (in real time) the number of active (or operating, in double conversion mode) UPSs depending on the actual loading requirements of the critical loads. The number of active UPS modules is always calculated by the system in order to maximize the energy efficiency while guaranteeing to the customer the desired level of redundancy so to preserve the critical load uptime. As previously mentioned: Energy efficiency with no compromises on uptime. In particular, the UPS system logic will work in such a way that when the critical downstream load is very low compared to UPS system rated power, the overcapacity is automatically switched to standby mode, in which modules consume much less power and thus help save energy. With this methodology, efficiency improvement is especially significant when the load is ≤ 25 percent of full UPS system capacity.

UPS modules within the system are put into active mode to protect the critical load.

6) Finally, the Xtra VFI functionality will rotate the modules between active/stand-by modes based on selected time intervals to guarantee a uniform ageing of the UPS units.

Referring to Fig.3, and assuming that the actual load of the system is 980 kW, the minimum number of UPSs that the logic will identify for active mode is 10. If a redundancy level of N+2 is defined (to guarantee a double level of redundancy), the system will then select 12 modules for active mode, sending all remaining 18 modules into standby mode, with consequent reduction of energy losses.

**System set-up:**

![3 MW parallel system with 980 kW actual load condition](image)

<table>
<thead>
<tr>
<th>Configuration</th>
<th>30 x 100 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>System total capacity</td>
<td>3000 kW</td>
</tr>
<tr>
<td>Specified redundancy</td>
<td>N + 2</td>
</tr>
<tr>
<td>Load power</td>
<td>980 kW</td>
</tr>
<tr>
<td>No. of active mode</td>
<td>12 pcs</td>
</tr>
<tr>
<td>UPS active capacity</td>
<td>1200 kW</td>
</tr>
</tbody>
</table>

**XTRA VFI features**
The XTRA VFI is a simple and robust functionality that delivers many advantages for data centers:

1) Enhanced double conversion efficiency
The system automatically scales the UPS system active capacity according to the load power to maximize efficiency. Efficiency measurements during FATs show efficiency gains up to 3.1 percent at 13 percent actual loading!

2) Full operator flexibility
Thanks to a very flexible system parametrization, the data center operator can define the optimum operating point for his system - always guaranteeing secure system operation through the definition of dynamic load steps and redundancy parameters set individually by the user.

3) Fault-tolerant operation
Both HW and SW have been structured to secure fault-tolerant conditions whatever the critical situation (either on the distribution or within the UPS itself). Specifically: a. In the case of mains failure or other abnormal situation, all modules turn to active mode inside a very fast reaction time b. In the case of failure of one of the UPS components managing the system level configuration (HMI or customer interface), the Xtra VFI will safely disconnect to enable the UPS to safeguard the critical load protection.
4) Double level of intelligence
The system architecture is based on a DPA (decentralized parallel architecture) concept to always guarantee no single point of failure.
   a. The first level of intelligence is implemented on the custom-
      er interface card, which manages the Xtra VFI algorithms.
   b. The second level of intelligence is implemented in the
      UPS CPU: The final decision whether a module will switch to
      standby operation is taken by the UPS CPUs, to secure pro-
      cess critical power in any critical situation.

5) Uniform system level ageing
The Xtra VFI implements a weekly rotation of the modules on
standby mode to guarantee uniform aging among the UPS
modules within the system.
   a. Once a week, each module decides if it needs to go
to standby or needs to remain active, based on the age
classification.
   b. The swap between modules that go into standby or go
into active mode occurs in this order: The modules that will
turn on (i.e., go into active mode) will swap first and only after
will the others go into standby mode. This increases system
security.

Commercial impact
The XTRA VFI has a direct impact on total cost of owner-
ship by directly reducing the data center power infrastructure
operating costs.

Let us consider, for example, a data center infrastructure as
depicted in fig.4 being deployed with 3x DPA500 ABB UPSs
fully populated with 100 kW modular UPSs. Under these con-
ditions, the full UPS system is capable of feeding up to 1.5
MW server loads.

Let us also assume that the output load of our UPS system
is limited to 150 kW only. Such a situation can easily arise in
all those Tier IV data center environments where the load is
being supplied through double-secured (through UPS) feed-
ers, and in conditions where the physical load (actual servers)
is increased as the data center business grows.

Under such operating conditions, if we tried to calculate the
system level operational efficiency, we would end up having a
low efficiency value, as shown here below.

### System setup
- Number of modules in system: 15 modules
- Module rating: 100 kW
- Load: 150 kW
- Electricity cost: 0.10 EUR/kWh

**Case 1: Xtra VFI disabled**
- Number of active modules: 15 modules
- Active module operating point percent of nominal load/module: 91.8%
- Active modules efficiency percent: 91.5%
- System efficiency percent (approximate): 91.5%

The reason being that all modules evenly distributing the load
supply power will be running at a fraction of their nominal
operating value (in this case at 10 percent of their nominal
operating power value) showing an operating efficiency of
about 91.8 percent. This configuration will then result in a
system level efficiency of about 91.5 percent.

If instead, the XTRA VFI operating mode is implemented, the
system will automatically identify the minimum number of
modules that need to be in online mode to securely supply
the critical load. In this case (critical load 150 kW), the system
would immediately select two modules to be in active mode.
Setting though a minimum level or redundancy (recalling the
need to securely supply power to the critical load) – in this
case corresponding to one module extra - the system will
select a total number of modules to be in active mode equal
to three, as below shown.

![Fig. 4: 1.5 MW modular system with Xtra VFI feature](#)
As can be seen from the above, thanks to such intelligent energy management algorithms, by switching several modules to standby mode, according to the real power demand, the overall system level efficiency will be boosted up by to 3 percent at least - with obvious financial savings.

Savings

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Efficiency gain</td>
<td>percent up to 3%</td>
</tr>
<tr>
<td>Power losses reduction</td>
<td>5.26 kW</td>
</tr>
<tr>
<td>Annual savings</td>
<td>4600 EUR</td>
</tr>
<tr>
<td>Savings over 3 years</td>
<td>13800 EUR</td>
</tr>
</tbody>
</table>

Easy information management

The XTRA VFI can be easily managed through the central graphical display of the UPS unit. In particular, a specific HMI tab has been implemented not only to program the units according to the customer needs but also to be able to provide immediate indicators and relevant KPIs to the data center operators. Simple menus provide system status indication and instantaneous, as well as cumulative, energy savings.

Conclusions

This paper has introduced a new operating functionality, the XTRA VFI, which serves to increase operating efficiency of a UPS system within a data center environment. Thanks to this newly integrated functionality, it is possible to optimize the power distribution efficiency level without compromising the load uptime - and in real time, as the load demand varies. Thanks to such smart power management, it is possible to optimize power infrastructure operating costs and thus significantly influence the total cost of ownership.

Author:

Antonio Coccia
ABB Power Protection SA
ABB to provide critical elastic infrastructure solutions for Serverius data center in the Netherlands

Data center and infrastructure provider selects ABB as a strategic partner for the renovation and expansion of the electrical infrastructure of its operation in Meppel
ABB has been chosen by Serverius, one of the largest data center providers in the Netherlands, to modernize its data center, delivering greater efficiency, reliability and quality.

With its own IP network and a global customer base, Serverius operates two data centers located between the largest internet backbones of Amsterdam and Frankfurt. Having experienced rapid growth over recent years, Serverius decided to modernize its data center in Meppel, ensuring that it is fully equipped for further expansion and to meet the ever-increasing demands of its customers.

The renovation project is aimed at minimizing downtime for existing customers and achieving a higher level of quality. For this purpose, the data center is carried out completely redundantly – from the grid operator’s incoming power supply to the final racks in the data floor.

ABB’s extensive knowledge and experience in the field of data centers played an important role in the selection, as Alfred van den Berg, Head of Technical Infrastructure at Serverius explains: “In addition to high-quality products, we can also make use of their international know-how. The execution of the entire project – from project management to final delivery has been entrusted to ABB’s Benelux Data Center team.”

Central to the new power infrastructure is ABB’s ‘TriLine’ distribution system, a proven solution that combines reliability and quality with safety. The system will be combined with a large number of redundant DPA 500 UPS systems, thus optimizing the availability of the power supply. One module will be used as an additional ‘safety system’ while the total installed UPS capacity of this 2N+1 solution will equal 1 MW.
Ciaran Flanagan, head of ABB’s Global Data Center business, commented: “We are very proud to be working with such a leading data center provider. We understand that intelligent data needs intelligent power and at ABB we focus on delivering the most flexible, reliable and intelligent data center solutions for our customers, ensuring their businesses run efficiently and safely 24 hours a day.”

ABB’s SMISSLINE TP system: the world’s first touch-safe busbar system is another critical element of the Severius modernization. This allows load-free modules and components to be made live and removed without the use of personal protective equipment (PPE) to protect against electrical hazards. The plug-in modules save installation time while the vertical installation in the control cabinet saves space.

Finally, ABB is also supplying its circuit monitoring system (CMS) system for energy consumption monitoring. This compact CMS is ideally suited for power monitoring and analysis, and energy efficiency optimization.

Gijs van Gemert, Managing Director at Serverius adds: “While we started in a barn in 2009, we have now grown into a major data centre player with international visibility and reputation. With customers whose expectations are constantly increasing, we want to continue to meet this demand, now and in the future. By partnering with ABB, we are assured that we will succeed.”
08. PCS100 AVC-40 for China’s food and beverage industry
   Power quality products ensure stable and efficient operation of a leading dairy manufacturer production line

18. Test center for large-scale UPS systems
   New facility for ABB in Switzerland allows advanced testing of high-power UPS systems

21. High architecture meets advanced technology
   Power protection for the next-generation data center

06. Data Center Forum 2017
   ABB is sponsoring the Data Center forum 2017, which is being held on 13th September in Moscow

10. Successful shore-to-ship power link in China
   Static frequency converter (SFC) providing reliable power infrastructure for a greener and more efficient port

18. Continuous power flow for the Central Bank of Malta
   Customized DPA UPScale ST UPS systems installed in the Central Bank data center

To receive one of the back issues shown above, email: powerconditioning@abb.com