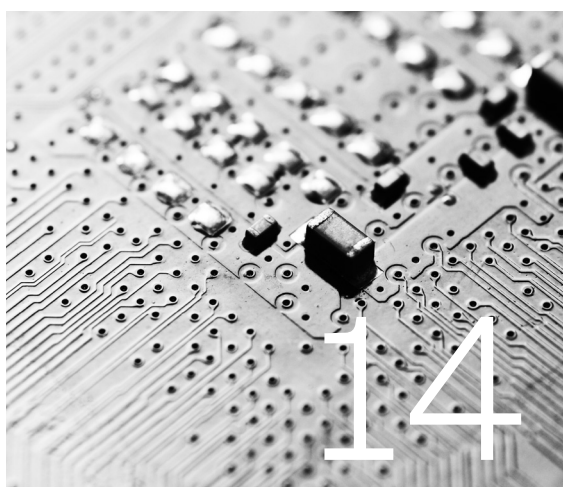


# power

A power protection  
magazine of the  
ABB Group

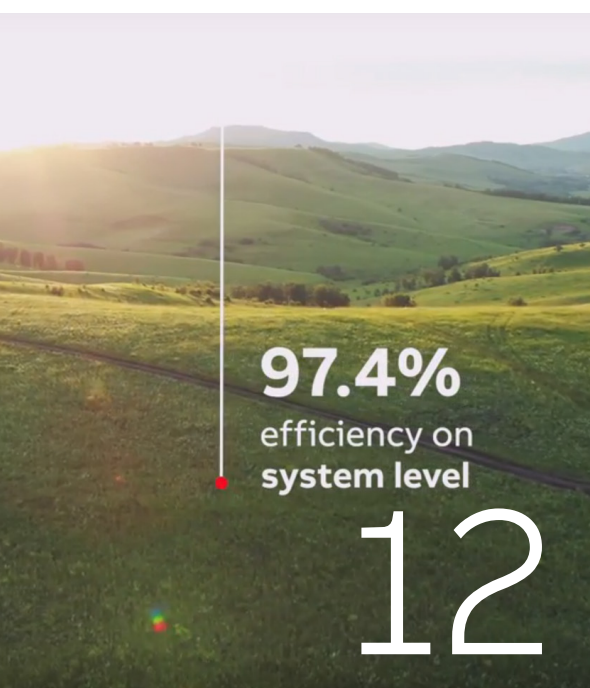
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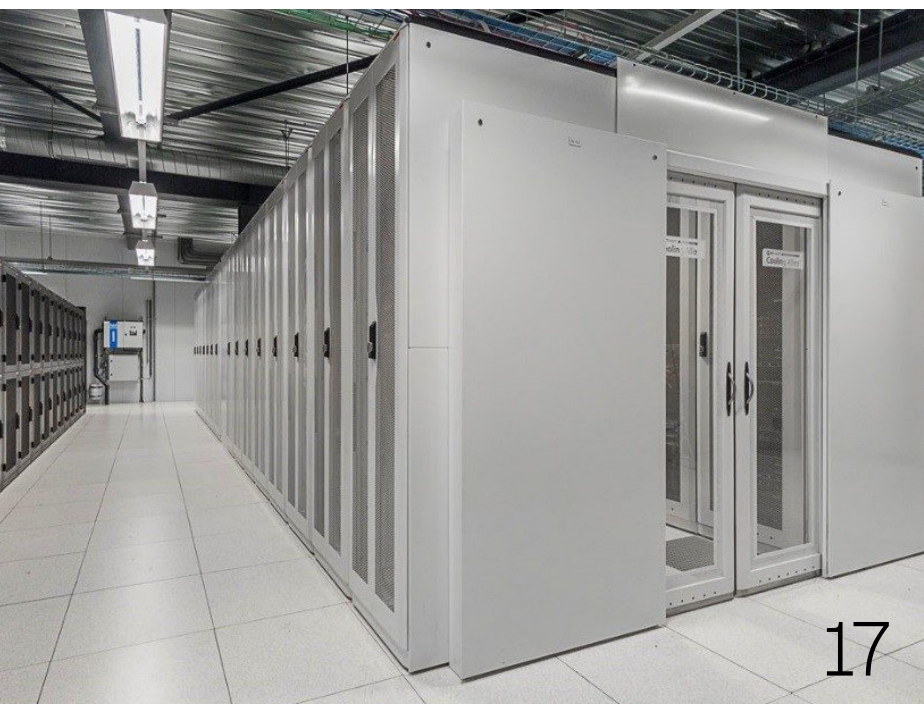
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97.4%  
efficiency on  
system level

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## EDITORIAL



Dear reader

The days are getting shorter in the northern hemisphere, indicating that the last months of the year are at hand and that the deepest winter season is approaching. Instead of falling into hibernation, the team of power protection is shifting to a higher gear for the mission of powering the future, with passion and innovation. I hope we can bring a bit of light into your daily routines with this new issue of power magazine!

The most exciting news of the year is the market launch of the new DPA 250 S4 – the world's most energy lean UPS! With its market-leading module efficiency of 97.6 percent, the UPS will allow our customers to decrease significantly the total cost of ownership of their critical power infrastructure.

In addition to its superior energy efficiency, the DPA 250 S4 includes many of the very best technological innovations we have introduced to the market in recent times, and it is a strong demonstration of the expertise and skills the power protection team has in development and introduction of top-of-the-market products. Read all about

this amazing new product in this issue! Don't forget, either, to check the ABB website for more details. We have also created a very nice video; you can find it on YouTube by searching "DPA 250 S4."

In this edition of our magazine, you will also find other very interesting news. Let me summarize some of the highlights for you.

One of our New Zealand colleagues from ABB power conditioning is interviewed in this issue about power protection solutions that prevent outages. Gary Aw, Business Development Manager for the semiconductor industry, has a long experience and good knowhow about the very strict requirements that this critical industry has when it comes to having a constant, clean power supply. Even the slightest power glitch in a fab can cause damage of many thousands of dollars to facilities, products and processes, so totally reliable power protection is a must.

Power supply events such as power outages, sags and surges represent one of the biggest threats to manufacturers and industrial facilities around the world. Like the semiconductor industry, for many organizations the damage caused even by a momentary interruption to an otherwise clean supply of electricity can be devastating. With the frequency and severity of power interruptions on the rise, many facilities are opting to install power protection systems to safeguard equipment and maintain productivity even under extreme power conditions.

To illustrate the point, we include a story of how one client has protected themselves and boosted productivity with ABB power protection products: One of Indonesia's largest milk powder producer has been equipped with an ABB solution that connects a PCS100 AVC and PCS100 UPS-I in an innovative

serial configuration to protect the factory's "fill and pack" process. The PCS100 AVC protects against voltage disturbances such as dips, swells, imbalances, flickers and phase-angle errors, while the UPS protects against power interruption or outages.

Enjoy this issue of power.

Elina Hermunen  
Head of product management,  
Power Protection

# ABB launches the world's most energy-lean uninterruptible power supply

The uninterruptible power supply (UPS) DPA 250 S4, with its market-leading module efficiency of 97.6 percent, offers more than 30 percent lower power losses, top reliability, zero downtime and low cost of ownership.

01 The DPA 250 S4 is specially designed for critical, high-density computing environments such as small- to medium-sized data centers.

02 It takes only 10 minutes to extract a module, replace consumable parts, insert it back to the system and turn it back online.

03 DPA 250 S4

The DPA 250 S4 features ABB's decentralized parallel architecture (DPA™), covers the power range 50 to 1,500 kW and is specially designed for critical, high-density computing environments such as small- to medium-sized data centers, commercial buildings, healthcare facilities, railway signaling applications and airports.

One DPA 250 S4 250 kW cabinet can host up to six 50 kW modules for 250 kW N+1 redundant power. Up to six 250 kW frames and up to 30 modules can be paralleled for 1,500 kW of uninterrupted, clean power. Secure ring-bus communication ensures there is no single point of failure in the system.

As well as providing a fully scalable and easily maintained UPS, with unparalleled uptime and energy efficiency, the DPA 250 S4's dual conversion mode ensures power going to the critical load is cleansed of any grid noise or fluctuations. Its transformer-free IGBT (Insulated Gate Bipolar Transistor) converters, which feature three-level topology with interleaving controls, mean that the device is lighter and more energy efficient, with reduced cooling requirements. The DPA 250 S4 delivers a market-leading module efficiency of 97.6 percent and a system efficiency of 97.4 percent, setting the standard for the future of UPS evolution. Power losses are more than 30 percent below those of similar products on the market, which has a direct impact on the total cost of ownership.



Elina Hermunen, ABB UPS Product Management, comments: "In a world in which skilled labor pools are shrinking, operating margins are tightening and energy efficiency is becoming ever more important, the DPA 250 S4 offers the customer a way to meet these challenges without having to compromise on quality or take the risk that the power to the critical load fails."





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A traditional UPS is very inefficient when the load is low. Under such conditions, ABB's Xtra VFI mode switches the UPS to 'lean-power' operation by optimizing the number of modules used to feed the load. In case of a load step, more modules are instantly switched to online mode. Xtra VFI mode also cycles the active modules to levelize aging.

Featuring smart and secure power connectors, the DPA 250 S4 modules can be online-swapped, while other UPS modules in the system support the load, which both speeds and simplifies maintenance.

Every DPA 250 S4 UPS module has all the essential functional units needed for independent operation. A primary benefit of the DPA is that it increases system reliability and availability compared to other modular UPS solutions as there is inherent redundancy between the UPS modules on all functional levels. DPA is ideal for organizations seeking zero downtime and low cost of ownership. Because DPA allows modules to be added as power needs grow, there is no need to oversize the original configuration, which reduces initial capital outlay.

The front-facing and top or bottom cable entry allow different installation schemes. Backup power options are flexible and lithium-ion batteries can be accommodated.

ABB has led the way in modular UPS technology and the launch of the DPA 250 S4 sets new standards in reliability and energy efficiency.



03

# Setting the UPS standard

## ABB's DPA 250 S4

01 DPA 250 S4

02 The DPA module display allows for easy module-level data access and module management.

03 The DPA 250 S4 is specially designed for critical, high-density computing environments.



01

In 2018, ABB launched its new modular uninterruptible power supply (UPS) – the DPA 250 S4. This UPS embodies, in one product, many of the technological innovations that ABB, a pioneer in the UPS business, has introduced to the market in recent times. The DPA 250 S4 will set the trend in UPS technology for years to come so it is worthwhile to explore what advantages its capabilities can bring to users. Dave Sterlace, ABB Global Head of Data Center Technology, and Diana Garcia, ABB UPS Product Manager, give the facts about the DPA 250 S4.

**ABB:** Dave, can you please tell us a bit about the client's challenges when it comes to power protection in today's data centers?

**Dave Sterlace:** I can! Power quality and uptime remain at the heart of data center operations. However, with the growth of hyperscale data centers, and their corresponding huge power usage, more emphasis has now been put on efficiency. You can see that with such high power bills, every little improvement in efficiency is worth a lot in dollar terms. The same lesson applies to smaller data centers too. There is also a new dimension: edge computing. The advent of edge computing requires high efficiency in sites that previously would have put the premium only on uptime. New solutions are, therefore, required to achieve both efficiency and availability.

**ABB:** What is the customer considering when choosing UPSs for the data centers?

**DS:** In the past, UPS decisions were based around "how big is it?" "how fast can I get it?" and "how much does it cost?" with no discernable difference between the UPSs. Now, there have been significant breakthroughs in both topology and

controls, allowing the UPS to be discernably more efficient and able to be a more active part of load management.

**ABB:** Diana, from the Product Manager point of view, why do you think customers choose DPA 250 rather than any other UPS?

**Diana Garcia:** In a word, "efficiency." At 97.4 percent, the new DPA 250 S4 UPS is the most energy-lean UPS on the market – thus decreasing power losses and the total cost of ownership. Further, the modular architecture makes it easy to expand and service as you can add or remove modules even with the power on. Uptime is good too, as each module has all the functional units needed for independent operation. If one module fails, the others immediately jump in and take up the load. That way, system reliability and availability are high compared to other modular UPS solutions.



**ABB: What features of the DPA 250 assist the customer in making their decision?**

**DS:** As Diana mentions, the decentralized parallel architecture – DPA – sure is a big plus. The ability to change consumable parts within 10 minutes affords a much lower MTTR than previous designs, boosting the reliability of the entire system. We can also install interface cards for remote control and monitoring of the UPS so we can have things like status and environmental data. This seamless integration into data center automation platforms gives a client an unprecedented insight into the running of their data center.

**ABB: Why is DPA 250 S4 a suitable power protection solution for today's data center?**

**DG:** The DPA 250 S4 brings high efficiency and high availability together in a small package. And, as Dave says, the DPA architecture allows a customer to raise reliability significantly versus traditional monolithic and modular solutions. Unlike traditional monolithic and other modular solutions, the UPS modules are on-line swappable, which allows the user to maintain the UPS without impacting the IT equipment. Furthermore, the possibility of an N+1 design using 50 kW building blocks versus a 2N 500 kW design with a monolithic solution offers unparalleled efficiency. We're also excited about the technology behind the DPA 250 S4, which uses three-level converters and interleaving controls that give performance equivalent to more exotic technologies like silicon carbide – but without the

added costs. Of course, the storage options include lithium-ion batteries with their higher power density, better recharge characteristics and longer service life – an option more and more data centers are taking up.

**ABB: And, Diana, what specific customers problems does the DPA 250 solve?**

**DG:** Apart from the advantages already mentioned, one aspect a lot of people forget is cooling. In a data center around 40 percent of all power consumed can go towards cooling! The DPA 250's high efficiency means less cooling is required – which, saves a lot of energy – and the cooling system is smaller, which itself, saves even more power.

**ABB: Can you explain the Xtra VFI feature and how it helps the overall efficiency?**

**DG:** As you may know, UPS power modules work most efficiently when they are heavily loaded. Light loading is simply inefficient. Let's say you have a DPA 250 cabinet with five modules. Xtra VFI is a clever feature that looks at the load the UPS is supporting and works out the optimal number of modules to use so they are all working in the best part of their efficiency curve. Then it switches the others to standby, ready to immediately jump into action if the load increases. This saves a lot of power and money, especially in locations with high power usage, like data centers.





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**ABB:** How easy is it to specify, install and commission DPA 250?

**DG:** We put in a lot of design effort into making it easy to install this UPS. We see that as a good selling point. For instance, the DPA 250 has a small footprint so it's not difficult for the customer to find a corner in their, usually very crowded, facility to fit it in. The modular architecture means that the specification is flexible as we can simply add a module or two should power needs grow or be larger than anticipated. Online access to status and environmental parameters and a clear HMI also ease commissioning as does the bottom and top cable entry, which means the footprint is not increased by having an extra cabinet for cable entry or having to leave space to get cables in.

**ABB:** Dave, if we may have your vision of the future, what challenges do customers still have, even with DPA 250, and how do you see these problems being solved in the future?

**DS:** Moving forward, I think we'll see the UPS become an even more critical part of the data center. I envision a data center as an active part of the grid, where a smart UPS could be a virtual power plant, taking on functions like frequency response, load balancing and demand response, allowing data center operators more flexibility in how they run their business. When integrated with ABB Ability™, data center automation systems, the data center of tomorrow will function as an active, integral part of a smart city's electrical and IT fabric.

**Authors:**

Dave Sterlace, Global Head of Data Center Technology, ABB

Diana Garcia, Mid- to high-power UPS Product Manager, ABB





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# The most energy-lean UPS on the market

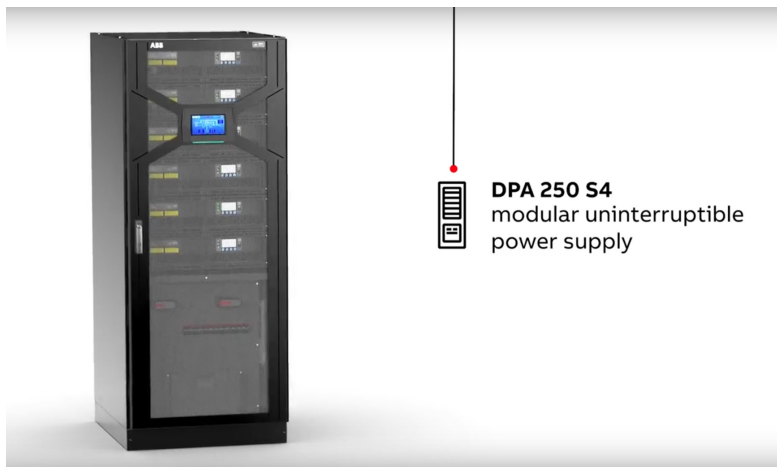
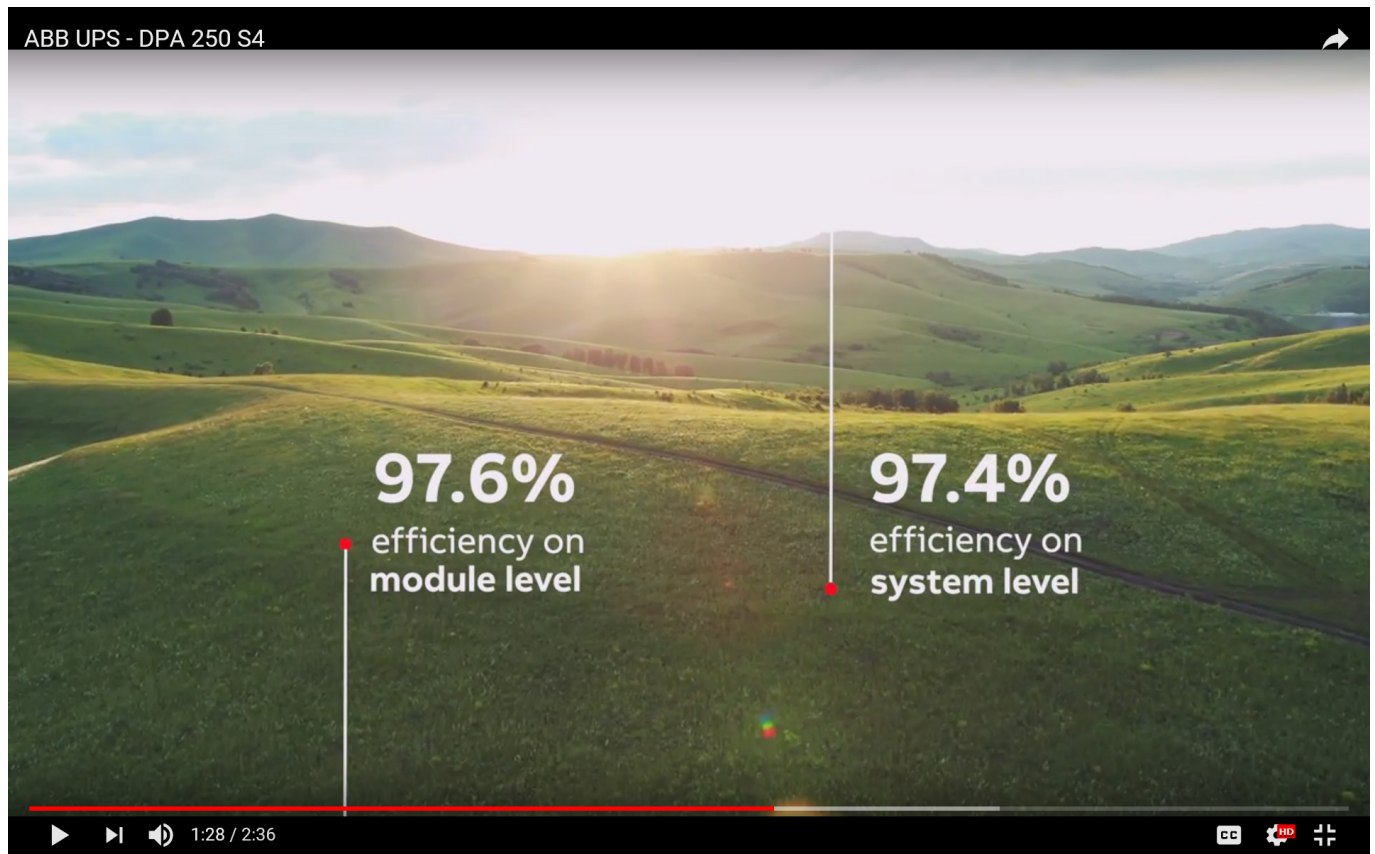
## DPA 250 S4

We've designed our modular DPA 250 S4 uninterruptible power supply (UPS) so you don't waste energy. Just slide 50 kW modules into the cabinet to get to the power levels you want. No need to install, power and cool capability you don't need right now. Expand the cabinet up to 250 kW – and add a redundant module too in case one fails or is removed for service. For maintenance, modules can be swapped online without powering off. And it takes less than 10 minutes to change a module. For your really big applications, simply connect up to six cabinets to get a whopping 1.5 MW. Our Xtra VFI feature saves you power costs by dynamically adjusting the number of active modules so the whole system works with optimal efficiency. And with a module efficiency of 97.6 percent and a system efficiency of 97.4 percent, you'll find your UPS uses about 30 percent less power than the nearest competitor. You'll have the most energy-lean UPS on the block. [abb.com/ups](http://abb.com/ups)





# ABB's DPA 250 S4 UPS now on video!



ABB's DPA 250 S4 high-efficiency, modular uninterruptible power supply is the ideal UPS solution for many enterprises, such as data centers, office buildings, healthcare facilities, railways and airports that need to be sure that they have a reliable supply of clean power. Watch the short video that highlights the main features of the DPA 250 S4, such as the online-swap modules that allow the system to be expanded, or serviced, without powering down or the Xtra VFI feature that optimizes the number of active modules so power consumption is further reduced. The video also showcases the Swiss factory where the UPSs are manufactured.

Link to the video: <https://youtu.be/ByPxGOCjwY>

# Productivity boost with ABB technologies for a milk powder producer

Revolutionary power protection technologies help a company reduce production losses and power quality issues by 100 percent.

01 ABB's PCS100 AVC-40 designed for sag correction in large commercial and industrial applications.

ABB delivered power quality solutions to help improve efficiency and productivity at a factory in Indonesia, and achieved a return on investment in less than a year.

Two of ABB's innovative power quality technologies have been applied, PCS100 AVC (Active Voltage Conditioner) and PCS100 UPS-I (Industrial UPS), the configuration provided the customer with significantly improved productivity and increased uptime to 99 percent

ABB's customer, experienced 50 to 60 power quality issues in 2015, severely affecting its sensitive production process. Losses worth millions of dollars were accumulated from production material scrap, excessive down time, and very high spare part costs. The application of a conventional solution of UPS double conversion did not succeed and the results were far below expectations.

ABB offered a solution involving connecting the PCS100 AVC and PCS100 UPS-I in an innovative serial configuration, to protect the factory's 'fill and pack' process. The AVC protects against voltage disturbances such as dips, swells, imbalances, flickers, and phase angle errors, while the UPS protects against power interruption or outages. The solution has been providing the company with total protection of critical loads since it became operational in January 2017. Both, annual cumulative production losses of \$5 million and around 60 annual power quality events have been brought down to nil.

"ABB is pleased to support our customer to achieve higher efficiency and productivity at its factory through our revolutionary technology", said Ferdinand Sibarani, ABB's Sales Engineer for Electrification Products in Indonesia.

The PCS100 AVC is ABB's energy-storage-free technology to protect industrial loads against an arrangement of voltage disturbances. With modular architecture, small footprint, and extremely high speed power electronic technology, positions the PCS100 AVC as one of the world's most efficient and effective voltage conditioning solution.

The PCS100 UPS-I is a single conversion power electronic device specifically designed to protect industrial loads against power outages or interruption. With unrivalled flat efficiency of more than 99 percent. ABB's innovative technology takes less than 2 milliseconds for the PCS100 UPS-I to transfer the load from normal supply mode to energy storage supply mode.

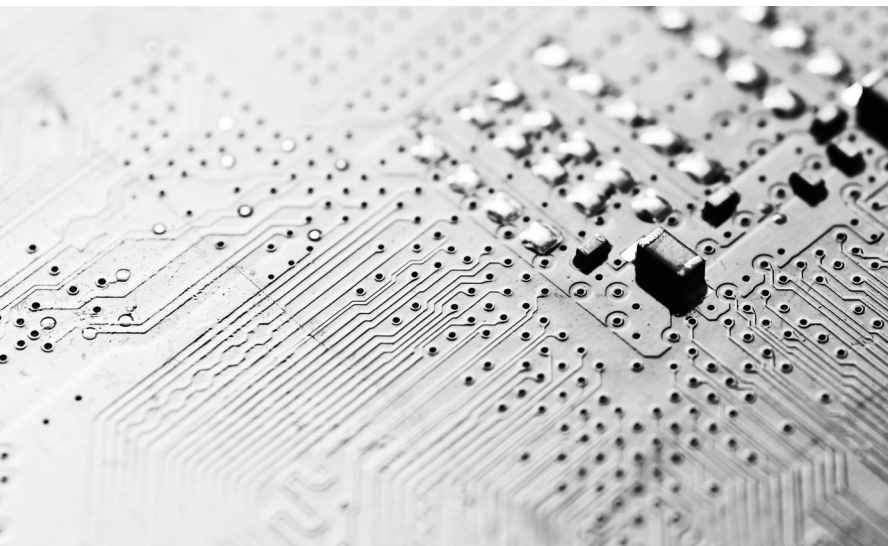
To find out more about ABB's power protection solutions visit [www.abb.com/ups](http://www.abb.com/ups)

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# Power protection for the semiconductor industry

An Interview with Gary Aw, ABB's power conditioning Business Development Manager for Semiconductor Industry.



Power protection is paramount in the semiconductor industry. Loss of power can be damaging for many facilities, products and processes. The semiconductor industry is very important as semiconductors serve the core building materials for important electronic products.

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— 01 Various products are produced by the semiconductor industry that we use in our daily life

— 02 ABB's power protection solutions have been installed in many of the industry's leading semiconductor facilities around the globe

— 03 From left to right: PCS100 AVC-40, PCS100 UPS-I, PCS120 MV UPS

In this interview, Gary Aw, Business Development Manager for Semiconductor Industry, from ABB power conditioning talks about their power protection solutions that prevent power outages.

## The Semiconductor industry is growing rapidly, why is power protection important?

Smartphones, PCs, servers, and the Internet of Things (IoT) have been driving the demand for semiconductor chips for the past few years. This trend has driven the demand for more chips, particularly memory chips, which in turn has spurred memory players to invest quickly in new chip fabrication plants.

Companies in China have also increased their investment in chip fabrication and back-end packaging plants, in line with China's "Made in China 2025" plan. These newly-built leading edge technology plants cannot afford to lose time, money, and market share from production losses due to

power quality events such as voltage sags and power outages. Hence why power protection is required to ensure that these investments are protected.

## What type of facilities, processes and products come under the semiconductor industry?

Various products are produced by the semiconductor industry that we use in our daily life, including memory, processors, sensors, power devices, optoelectronics, and displays. Facilities can be split broadly into three categories: silicon wafer plants that produce bare wafers, fabrication plants (FABs) which produce the chips, and packaging plants which package and test the chips.

Processes in a silicon plant include growing ingots, wire saws, slicing wafers, and polishing. Typical processes in a fabrication plant include lithography, etching, deposition, and chemical and mechanical polishing. In packaging plants, typical processes include dicing, bumping, molding, testing, and binning.





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**What would happen if a facility didn't have a power protection solution in place?**

The cost of lost production, quality, downtime, and eventually lost profit and market share can be at a massive scale for semiconductor FABs that are not sufficiently protected. Every day semiconductor facilities face a potential risk from voltage events. Often we do not read about them in the news, except when a major event occurs. However, there was a major event that was recorded in March 2018, when there was a brief outage at Samsung's Pyeongtaek NAND memory fabrication plant. An analyst estimated that 3.5 percent of the global NAND flash supply for March was affected by this event.

**What Power Protection solutions does ABB offer that can help the semiconductor industry from interruptions which can be very damaging?**

With over 20 years history in power protection equipment, ABB offers a wide coverage with low voltage and medium voltage power protection systems to protect the semiconductor industry against voltage sags and interruptions. This equipment is designed for various voltage inputs, power ranges and autonomy protection time and can be fitted for outdoor and indoor conditions.

**What type of equipment can ABB's power protection solutions protect? What sets them apart from others on the market? What are the features and benefits of the product range ABB offers?**

To cover a range of semiconductor customer needs, ABB offers three products that can be installed to protect these critical facilities against voltage sags and power interruptions.

- a. The PCS100 AVC-40 is an active voltage conditioner for large industrial and commercial applications. It uses no energy storage to correct sags and swells to ensure the critical facilities receive clean, premium power.
- b. PCS100 UPS-I is a high performance, high efficiency industrial UPS that ensures protection from power quality events, such as deep sags or short-term outages. It enables continuous power supply to modern industrial processes.
- c. The PCS120 MV UPS is the next generation of medium voltage UPS intended for multi megawatt power protection. Based on the revolutionary ZISC architecture, the PCS120 MV UPS introduces a flexible solution for higher reliability and higher efficiency in critical power facilities.



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**Can you tell us any case studies where ABB solutions were implemented to help protect semiconductor solutions?**

ABB's power protection solutions have been installed in many of the industry's leading semiconductor facilities around the globe, however in many cases due to the sensitivity of projects, we cannot reference company specifics. As an example, we recently received an order from a semiconductor test and assembly packing plant that builds discrete, logic, and MOSFET devices and will be using our PCS100 AVC-40 to protect their test equipment line, which has been facing productivity disruptions from voltage sags.

**Tell us how the PCS100 AVC-40 is one the best solutions for plant protection?**

Each semiconductor customer has different needs for their plant protection, so one solution does not fit all. However, the PCS100 AVC-40 does offer the best solution with respect to optimal footprint and cost to our end customers who suffer primarily from voltage sags.

**What does ABB's power protection solutions mean for the future of the semiconductor industry?**

ABB's power conditioning team engages continuously with our customers and develops solutions to meet their specifications and needs. We also have an exciting pipeline coming through with our next generation products, which will be launched in the near future.

# Feeding the data beast

Keeping up with the exponential growth of data

—  
01 ABB is helping data center operators to ensure that our data is stored reliably, efficiently and at the minimum cost to the environment.

Trying to get your head around the amount of data that is produced by modern society can be mind-boggling. Billions of devices and machines are getting connected to the internet, sending and receiving so much data that global traffic is now measured in zettabytes (that is 10<sup>21</sup> bytes).

Most of this traffic goes through data centers, which are springing up rapidly around the world to keep pace. Data centers are energy-hungry, devouring huge amounts of electricity, equivalent in consumption to a small town. According to ABB assessments, data center traffic will grow by 400% over the next three years, with worldwide data center energy increasing to 60 gigawatts, or 2.5% of global electricity consumption by 2020.

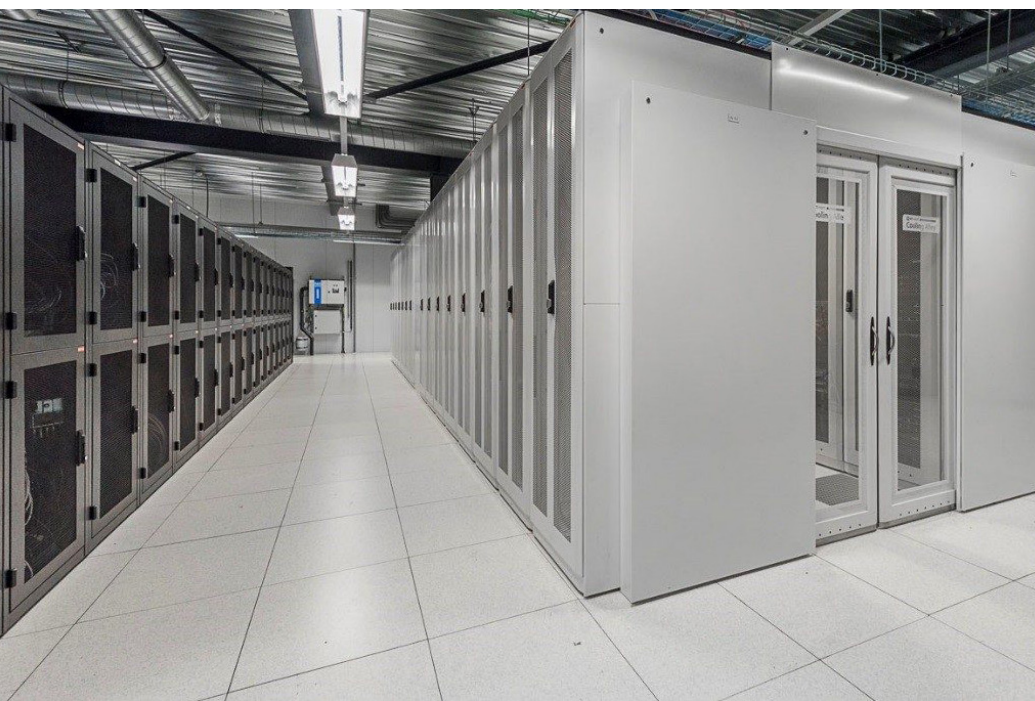
As data centers grow in size and number, owners and customers have a major incentive to manage their energy use wisely. Energy accounts for up to an estimated 40% of the total cost of ownership and, if centers do not become more efficient and innovative, their growth could be constrained by overloaded national power grids.

ABB is a leading partner in the industry's efficiency drive, and ABB Ability™ digital solutions are bringing down costs and energy-use for customers across the world.

In the Netherlands, for example, Alticom has installed micro data centers in telecommunications towers across the country, using space made available as telco technology switched from analogue to digital, shrinking drastically. The thick walls, cool air at altitude and relative ease of securing the sites make these iconic towers (one of which is the country's tallest building) ideal for safeguarding data. ABB Ability Data Center Automation allows Alticom to remotely monitor and control the cooling and energy use of all 24 of its towers, making it one of the major elements helping Alticom to run the centers more efficiently.

Following a recent partnership with IT giant Hewlett Packard Enterprise (HPE), we can expect even more technological breakthroughs in the coming years. The two companies are developing an intelligent solution that promises to optimally balance data center workloads and power resources, and cut costs.

Almost all aspects of our lives are becoming digitalized, from hospitals to financial institutions to transport, and the consequences of losing that data (or access to it) are potentially devastating. ABB is helping data center operators to ensure that our data is stored reliably, efficiently and at the minimum cost to the environment.



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For more information contact your local  
ABB representative or visit:

**[www.abb.com/ups](http://www.abb.com/ups)**