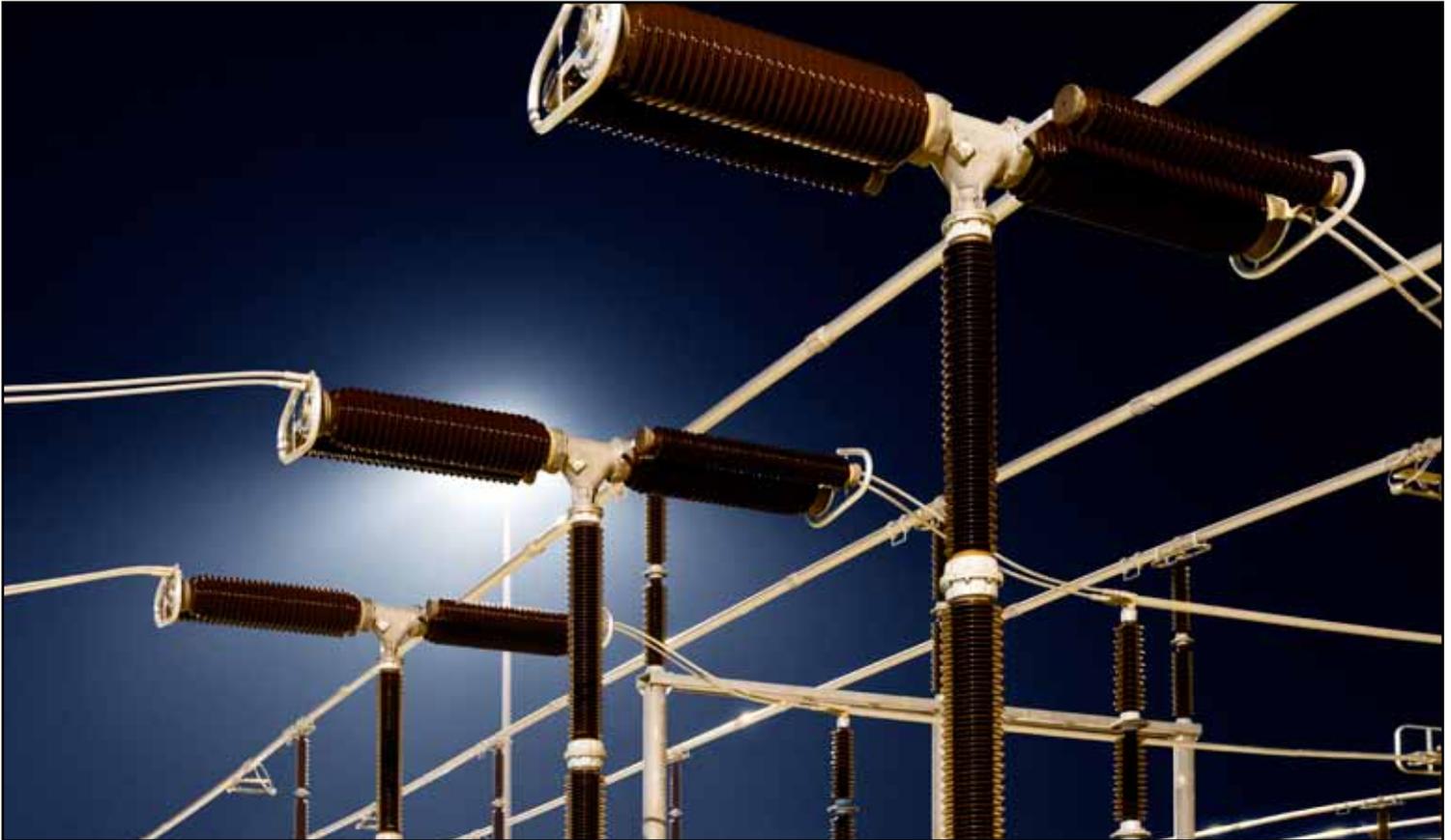


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A power conversion magazine  
of the ABB Group

# power



## Stabilizing voltage

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ABB's power protection solutions for the semiconductor industry

### **An oil and gas solution – 08**

Future investment for Gubkinskiy GPP

### **Rail power – 10**

ABB's UPS for the world's largest railway construction project

### **Harnessing the power of the ship – 16**

ABB converter technology help save 20 percent fuel on ships

Power and productivity  
for a better world™



Providing an oil and gas solution to Gubkinskiy GPP, through to UPS support for the North-South Railway in Saudi Arabia. It's business as usual with ABB's power protection products.



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## power

**John Penny**

General Manager  
Power conditioning products  
Power protection

We have a new name for our magazine! Things have changed and we have moved from the old “Insider” to the new “Power” magazine with increased attention given to the wide range of Power Protection solutions available from ABB and much more focus on our customers and their interesting applications.

The Power Protection team is also growing, with the US based Power Solutions group joining the existing Swiss UPS and New Zealand based Power Conditioning product lines in an extended Power Protection product group. Formerly part of the Thomas and Betts organization acquired in 2012 by ABB, the Power Solutions team are well known for their Cyberex branded static transfer switches, specialize industrial UPSs and the JT Packard service organization. We hope to include some interesting stories from this team in our next issue.

ABB is well positioned to meet any power protection requirement from computer room UPSs through to the protection of sophisticated data centers or industrial plants. Our applications and market spread is wide, as you would expect from a truly globally organization. Not only do we have manufacturing and center of excellence factories in Europe, the USA and Asia Pacific, but we have sales and service capability close at hand globally.

In this issue of “Power” you can read about the huge success ABB has had in protecting semiconductor manufacturing plants for some of the world’s largest corporations. Arguably these plants have the most sensitive and critical industrial loads with huge costs of lost production if not adequately protected from voltage sag and short outage events. We have now supplied over 800 MVA of power protection equipment to the semiconductor industry, making us a market leader.

Mega data centers are becoming like large semiconductor plants in many ways, drawing tens of megawatts of power, often closely connected to the electrical transmission system and suffering from many of the same challenges of space, environmental challenges and striving for ever-higher energy efficiency. With the imminent release of ABB’s UPS product at medium voltage, we challenge if industrial UPSs have a place in the mega data centers for very high power protection – we think so.

ABB’s PCS100 Active Voltage Conditioner has been used to protect the Gubkinskiy gas plant in northern Russia, not only proving our

wide global reach, but also how effective our products can be in industrial and in particular oil and gas applications.

Moving from one oil center to another, PowerWave and PowerScale UPSs have been used to protect critical equipment in Saudi Arabia’s North-South railway project. This is presently the world’s largest railway construction project and a vote of confidence in ABB’s UPS products.

Finally for voltage and frequency stabilization, ABB has supplied two 875 kVA PCS100 Static Frequency Converters on two RO/RO Vessels, Corona Seaways and Hafnia Seaways. MAN Diesel and Turbo worked together with ABB to test whether it was possible to reduce the fuel consumption of the ship by lowering its engine speed. ABB and MAN-diesel were able to reduce fuel consumption by 20 percent, a significant result.

Enjoy this issue of Power.



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The Power converters and inverters playlist can now be found on the ABB YouTube channel.

Click [here](#) to watch the latest videos.

## Latest Videos



### [ABB's PCS100 MV UPS trailer](#)

Experience complete power protection Watch the PCS100 MV UPS movie trailer [here](#).

Countdown to the official product launch with ABB, where product information and videos will be revealed in June on [www.abb.com/powerquality](http://www.abb.com/powerquality)

## Contact Us

[www.abb.com/pcs100-power-converters](http://www.abb.com/pcs100-power-converters)

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Grid interconnection  
Energy storage and grid stabilization

[www.abb.com/UPS](http://www.abb.com/UPS)

**FOR** UPS and Power Conditioning



# Demand for chip-based products

ABB's solutions for the semiconductor industry.

The semiconductor industry is becoming increasingly important as semiconductors serve as the core building materials for important electronic products. Semiconductor devices range from the extremely small, lightweight memory chips and microprocessors, through to power semiconductors that are highly efficient and reliable. Today, the semiconductor industry has grown to be a multi-billion dollar industry, representing close to 10 percent of world GDP.

### Semiconductors are everywhere!

When you switch on your smart devices for texting, web surfing, email, photo/video-taking, music, you're entering the world of semiconductors. They have changed the way we live and see the world. If you open your device you will find numbers of powerful chips and fine OLED inside. What you may not realize is the production of these sensitive chips requires and extremely high quality of electrical power. Without advanced power protection this is simply not available from the electrical utility. The costs of lost production, down time, quality and ultimately lost profit can be of huge scale for semiconductor manufacturing fabrication plants (FAB's) that are not adequately protected. Investing in the best power protection has many benefits, and choosing a solution for your given requirement, will future proof your equipment from the devastating effects of a power quality event. ABB's power protection portfolio is a unique line up of UPS and power conditioning products, designed to solve power quality issues for semiconductor applications.

### What are your options?

ABB's PCS100 Active Voltage Conditioner is a "battery free" solution to the most common utility problem, voltage sags, along with swell protection and continuous voltage regulation. The PCS100 Reactive Power Conditioner is designed for correcting power factor, low order harmonics and imbalance issues often created by some semiconductor tool loads. The PCS100 RPC reduces system current thus enhancing energy efficiency and power system capacity. The PCS100 UPS-I is tailored towards the demands of industrial applications such as sensitive tools, motors, drives etc. It also provides protection during deep sag and swell events, plus outages lasting between seconds and minutes depending on storage (super capacitors or batteries) and system loading. Payback time for a PCS100 UPS-I is typically less than 12 months as the problems it protects the plant from can be so expensive. The ultra-fast transfer time of less than 2 milliseconds, the exceptionally small footprint – 50 percent smaller than competing solutions, and the long and more economical operating life are also attractive features of the PCS100 UPS-I.

This June, ABB will launch the PCS100 Medium Voltage UPS (PCS100 MV UPS). The first release, will be rated up to 6 MVA at 6.6 kV with even larger 15 kV class products to follow (including 11 kV and 13.2 kV options), with even higher MVA ratings. The need for expansion is due to ABB's PCS100 low voltage UPS-I's success in the semiconductor industry, and the needs of customers with large sensitive and critical loads. The modular and scalable architecture of ABB's power protection portfolio enables compatibility between the systems, ensuring success in combatting common power protection challenges. Semiconductor companies can add ABB's power conditioning systems, such as the PCS100 Active Voltage Conditioner, UPS-I or the Reactive Power Conditioner to their existing plants although many companies choose to apply the products extensively on new FAB builds.

### A solid relationship is key

ABB has developed and installed many power protection solutions for the semiconductor industry. This year ABB has developed nine PCS100 Industrial UPS-I's (PCS100 UPS-I) for a major LCD plant in China and two PCS100 Active Voltage Conditioner (PCS100 AVC) for a world-leading semiconductor manufacturing corporation, also based in China. In addition, SK Hynix, a preeminent player in the memory chip industry, based in Korea, has selected multiple PCS100 AVCs for their M12 12 inch wafer fabrication line. ABB

and SK Hynix have a past relationship, with SK Hynix using ABB's technology to protect their many production lines from voltage disturbances including the M11 production line. Now called the M12 production line, it is an extension of the M11 and M8 lines. With the completion of the M12 line, it can produce up to 40,000 of the 300-millimeter wafers on a monthly basis.

ABB has supplied leading edge solutions to Samsung's \$3 billion liquid crystal display production facility in Suzhou – the biggest single investment ever made by a South Korean company in China. To safeguard from potentially crippling power, Samsung selected eight PCS100 UPS-I's, which have a combined protection capacity of 16.5 megavolt amperes (MVA) of electric power. Furthermore, Samsung last year selected 22 PCS100 UPS-I units for the \$7 billion NAND flash plant in Xi'an. This facility has a monthly output of 100,000 nanometer chips which are used primarily in memory cards, USB flash drives, solid-state drives, and similar products for data storage and transfer.

Another turn-key solution that has been successfully installed was at Toshiba Mobile Display Co. Ltd's (TMD) manufacturing facility in Ishikawa, Japan. TMD chose ABB's PCS100 AVC and PCS100 UPS-I due to the proven market and cost performance in power quality and protection. TMD had found in other factories that voltage sags were mainly caused by extreme weather, such as thunderstorms. To prevent this, TMD had been predicting thunderstorms and temporarily switching to an alternative standby supply. However, this practice resulted in the expensive use of fuel and could be avoided in all but the worst situations once the ABB PCS100 products were installed.

Mr. Shinji Kubomae, TMD's Specialist Production Engineering Group 2, Process and Manufacturing Engineering Dept. states, "Since PCS100 AVC was introduced, we were able to be flexible in deciding whether or not to have full back up to the protected load. As a result, we achieved significant cost cut, as well as space saving and energy efficiency. "In addition, TMD experienced other benefits from working with ABB, including the achievement of a tight timescale for an intensive installation process that was required to be in place prior to the start of winter, in order to test the full extremities of environmental forces.

Mr. Yoshiyuki Iida, TMD's Group Manager, Manufacturing Group, New Clean room Promotion Dept. comments, "We appreciate ABB's efficient installation operation with professionalism and dedication of staff members demonstrated in the project. "Since the installation, both products have performed to a high standard and in the future, TMD predicts ABB will provide them with power protection technology as highlighted by Mr. Yoshiyuki Iida, "We are also looking forward to communicating with your team to exchange technical information on your wide range of portfolio."

ABB's PCS100 power protection products continue to supply solutions for semiconductor applications, and have supplied over 800 MVA of power so far to the semiconductor industry.

To find out more about ABB's PCS100 power protection solutions for the semiconductor industry, please visit:

[www.abb.com/pcs100-power-converters](http://www.abb.com/pcs100-power-converters)





# Oil and gas industry in Russia

PCS100 Active Voltage Conditioner – future investment for Gubkinskiy GPP.

The oil and gas industry is one of the most socially important sectors in Russian economy. Active development of this sector primarily depends on energy-consuming manufacturing processes and quality of electricity supply at all stages of production process. ABB has developed and implemented two PCS100 Active Voltage Conditioners (PCS100 AVCs) to protect power systems for a leading gas and processing plant, Gubkinskiy GPP. This will eliminate voltage sags caused by the external power grid.

Gubkinskiy GPP is the northernmost gas processing plant in Russia. It was built as part of the "Sibneftegazpererabotka" association in 1988. Today, it is a branch of a leading gas processing enterprise JSC "SiburTyumenGaz" which main activity is associated petroleum gas (APG) acceptance and processing. Gubkinskiy GPP produces a broad fraction of natural gas liquids (NGL). NGL is the most valuable raw material for petrochemical industry, which is also used for producing a wide variety of consumer goods from polyethylene film and disposable tableware, to plastic tubes for land reclamation. "SiburTyumenGaz" also carries out APG compression and dehydration and provides local consumers with fuel gas.

### Identifying the cause

Voltage sags, when the root mean square (rms) voltage decreases between 30 and 40 percent of nominal voltage for a period of 1-2 seconds, often become the actual cause of poor electric power quality. They can occur by reason of natural phenomena such as storm and hurricane and technical activities carried out on high-voltage side of transmission lines.

Gubkinskiy GPP's economic losses were caused by a voltage sag by the external power grid which was caused by man-made and natural factors such as power supply companies system emergencies, working peculiarities of high power consumers (e.g. starting up high power compression facilities, etc.), single phase – ground faults, two phase – ground fault in external overhead transmission lines caused by unfavorable natural conditions (strong winds, thunderstorms, etc.).

All these factors led to shutdown of sensitive to voltage sags technological equipment. This resulted in operational delays and financial losses. It was necessary for GPP to eliminate voltage sags of 20 percent of nominal voltage and duration of up to 2 seconds. To maintain seamless and secure operations in these areas, efficient, high-quality and uninterrupted power supply is of primary importance.

### A power protection solution

The PCS100 AVC has a number of advantages over traditionally used solutions to this problem. These are high efficiency (97-99 percent), small footprint, high integration (solution completeness), and no serviceable parts. The PCS100 AVC consists of a booster transformer, a DC link, IGBT inverters, a bypass system and an electronic control system, making it the ideal solution for Gubkinskiy GPP.

Unlike many other modern solutions for protection of electrical systems ABB's PCS100 AVC system has small footprint. Many industries today, including Gubkinskiy GPP have limited floor space to install vital equipment. Therefore, it was important that the installation of the PCS100 AVC was compact in size due to the existing small space of the power facility. The industrial design of the PCS100 AVC and internal bypass guarantee high reliability of this solution



ABB's PCS100 Active Voltage Conditioner installed at Gubkinskiy GPP

and makes it possible to use in harsh environments. Moreover, since the PCS100 AVC consumes additional current required for voltage correction from the power supply network, the system no longer needs an energy storage unit. This leads to lower costs for maintenance and high efficiency of the system which is greater than 98 percent.

### Proven results

Over a period of operation at Gubkinskiy GPP, ABB's PCS100 AVC avoided a number of potential shutdowns caused by voltage sags by the external grid and thus reducing lost production and financial costs of the plant. In future, Gubkinskiy GPP plans to investigate the possibility of buying another PCS100 AVC set for protection of the second production line.

So far, ABB has installed PCS100 AVC systems with a total capacity of more than 381 MVA and PCS100 based system with a total capacity of more than 800 MVA for commercial and industrial applications.

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

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

To find out more about ABB's PCS100 AVC range, please visit: [www.abb.com/pcs100-power-converters](http://www.abb.com/pcs100-power-converters)





# Rail power

ABB's UPS for the world's largest railway construction project.

ABB is supplying uninterruptible power supplies (UPSs) to the North-South Railway (NSR) project in Saudi Arabia – the world's largest railway construction undertaking. This mammoth enterprise will see a 2,400 km passenger and freight rail line built from Riyadh to Al Haditha, near the border with Jordan. ABB's PowerWave 33 and PowerScale UPSs will support all IT, ticketing, telecom and surveillance systems at five stations as well as at the new passenger station in Riyadh. ABB UPSs will also protect the traffic control center. Commissioning will be completed during 2014.

# A UPS system protects critical loads against supply aberrations including total mains failures.

The North-South Railway (NSR) project in Saudi Arabia is not only the world's largest railway construction, but also the longest route to adopt the European train control system (ETCS) to date. It is a 2,400 km passenger and freight rail line that runs from the capital city Riyadh, in the northwest of the country, to Al Haditha, near the Jordanian border.

Due to its strategic importance to the national economy, the North-South Railway has been given priority over the other projects. It is an integral part of the planned phosphate and bauxite mining work in the northern region of the country, where these ores are available in commercial quantities. They can be exported from the processing facilities at Raz Az Zwar on the Gulf coast. When finished, this new infrastructure will make Saudi Arabia the second-largest exporter of minerals in the world.

## North-South Railway project

The 2,400 km single-track, North-South Railway project involves sidings, yards, depots, stations and administrative facilities. The total cost of the project is estimated to be \$3.5 billion, and will be financed by the public investment fund (PIF) managed by the Ministry of Finance. The project commenced in 2005 and freight operations began at the end of 2010, while first passenger operations started some two years later.

A commercial corporation, Saudi Railway Company (SAR), was created to maintain and operate the North-South Railway line through a contract-based operator. European-style signaling, ticketing, communications and security systems was installed and commissioned by the French group, Thales and by the Saudi Bin-ladin group for \$453 million.

## North-South Railway infrastructure

The North-South Railway will have 107 bridges and 2,679 culverts along the 2,400 km freight and passenger line. The entire 2,400 km rail route will be equipped with a centralized traffic control (CTC) signaling system. In addition, the industrial rail line will be equipped with a computer-assisted manual block system.

## UPS in passenger stations

A modern railway network is critically dependent on a stable and reliable supply of good-quality power. Without it, trains simply do not run. The customer chose ABB's UPSs for the NSR and these were installed in two separate projects. The first project provided UPS support for all IT, ticketing, telecom and surveillance systems in five passenger stations – Hail, ALJof, Majmaa, Qassim and Qurayat. Each station has nine UPSs altogether: six PowerScale and three PowerWave 33 (2 X 60 KVA parallel system) devices, each capable of 15 minutes full autonomy at full load. The PowerScale devices in this first project were rated at 15, 30 and 40 kVA – with two of each being supplied. All the UPSs in this first project will be online by mid-2014.



ABB's Powerscale and Powerwave UPS systems

## New passenger station in Riyadh

The second project was dedicated to equipping the new passenger station in Riyadh, again to support all IT, ticketing, telecom and surveillance systems. The new station has a total of 12 UPSs. Six of the PowerScale devices have identical specifications to those in the other passenger stations, but in Riyadh there is an additional PowerScale – a two-unit 40 kVA system configured in parallel that provides 30 minutes of full autonomy.

The PowerWave 33 UPS backup is much beefier for this critical, central station: there are no less than four two-unit 60 kVA systems configured in parallel, plus a two-unit 40 KVA parallel system, each of which provides 30 minutes of full autonomy. Delivery of Riyadh equipment started at the beginning of 2014 and implementation will take place in Q3. Besides protecting the regional passenger stations and the main station in Riyadh, ABB's UPSs have also been chosen to protect the traffic control center.

Amir Sanadi, Operation Manager at Site Technology, ABB's business partner who acquired the project and is implementing it, said, "it is quite an accomplishment for ABB's UPS technology to be chosen for a project of this scale. Our client was very particular and chose ABB because of its reputation and experience in this field and its advanced, and proven, UPS technology that will guarantee maximum availability of power to this flagship infrastructure project."

To see further technology information please visit: [www.abb.com/UPS](http://www.abb.com/UPS)





# Industrial UPS in a data center

Is it time for industrial UPS systems in data centers?

No one would ever mistake a data center for a production plant. While manufacturing and process facilities often are dusty, noisy, hot and humid locations, data centers traditionally have been clean, quiet, climate-controlled spaces. As the demand for ever-higher volumes of data — especially video — has grown, however, are data centers beginning to take on some characteristics of the plant?

Data centers are becoming very large and are demanding more power. Server density is increasing rapidly, and power distribution systems are consuming more space. Some operators are allowing temperatures to rise inside the data center as a method of containing cooling costs, while others are using ambient air from outside to cool equipment, potentially exposing IT equipment to airborne contaminants. In short data centers are slowly turning into industrial data factories by using industrial UPSs for power protection.

Smaller data centers are normally connected to the electrical distribution system along with all sorts of other city, industrial and commercial loads, all strung together with miles of overhead or underground cables. In these sorts of networks, longer term outages and significant voltage variations can be common place which makes the traditional double conversion data center UPS a sensible power protection choice. Large and mega data centers are often closely connected to the super reliable electrical transmission system that connects cities and power stations. Voltage regulation is very good and the more common problems are short voltage sags and micro-cuts, meaning the ultra-efficient, small footprint single conversion UPS technology as used industrially can be a more optimized solution.

The job of the UPS is to filter and transform incoming AC power so that it is clean and stable, as well as to supply emergency power from a string of batteries until a backup generator comes on line and reaches operating speed, a period of usually less than 10 seconds—a timeframe mandated by fire protection standards in many countries. Short circuit fault levels in large data centers can also be high making the design of circuit breaker protection difficult and often exceeding safe ratings for transitional commercial UPSs. Industrial UPS devices are designed with higher overload ratings not only making them more rugged and safer but also providing a design engineers with more chance to implement protection discrimination. This means a fault is more likely to trip the circuit breaker protection without damaging the UPS.

Traditional large industrial UPSs have often been rotary, offering rugged performance but with the downside of moving parts to maintain and less than optimal efficiency. A new generation of large single conversion static industrial UPSs are appearing on the market such as ABB's PCS100 UPS-I Industrial grade UPS available in ratings up to 6 MVA and in voltages from 208 Vac through to 480 Vac in low voltage and now medium voltage. The medium voltage UPSs are being used in mega data centers and ABB's PCS100 MV UPS is designed specifically for this market. Launched June this year, the product has been designed for customers with large sensitive and critical loads. With a rugged centralized static transfer and fully modular redundant inverter, both UPS products are not only serviceable, but highly reliable and come with a small footprint. The design life and temperature of components used in the products are also higher than typical commercial grade UPSs which combine with the greater than 99 percent efficiency to mean very low ownership costs.



ABB's PCS100 MV UPS designed for mega data centers (official launch in June)

Industrial UPS systems are also compatible with the latest generation of energy storage technology such, as the small footprint super capacitors and lithium ion battery options along with the more traditional lead acid options. Lead acid batteries remain the lowest capital cost energy storage options but when footprint, lifetime costs and reliability is considered they may not always be the best option. Considering its emerging needs and all the options for UPS, electrical products manufacturer Thomas & Betts, a member of the ABB family of companies, recently chose the PCS100 industrial quality UPS (PCS100 UPS-I) for its own data center in Memphis. As a demonstration project, the unit—produced by ABB—will back up the data center as well as other critical areas, including the customer service department (1).

“We are raising the temperatures in our data center, so we needed a more robust solution,” noted Dave Sterlace, Market Development Manager for Data Centers and Critical Power at Thomas & Betts. “We didn't think a flywheel UPS would be an easy retrofit, but the PCS100 UPS-I gave us the robustness and high efficiency we wanted, along with less complexity in the battery string. We like this unit's power electronics, its ruggedized features and the ability to incorporate its maintenance easily into our regular preventive maintenance program.”

1. Watch how ABB provided a data center solution to Thomas & Betts [here](#)

Download ABB's data center solutions brochure [here](#)

To find out more about ABB's PCS100 UPS range, please visit: [www.abb.com/pcs100-power-converters](http://www.abb.com/pcs100-power-converters)



# ABB's power protection portfolio – power conditioning

## PCS100 AVC (Active Voltage Conditioner)

- Protects sensitive loads from the most common disturbances in utility supplies
- Sags, surges, unbalance, flicker and poor regulation are corrected within a few milliseconds
- High power and performance inverter-based system
- Operating efficiency 97 to 99 percent (model dependent)
- Very small footprint due to no storage to operate
- Rated 150 kVA - 30 MVA. Download PCS100 AVC brochure [here](#)

## PCS100 UPS-I (Industrial UPS)

- The PCS100 UPS-I is the ideal solution where very deep sags or short term power outages are a problem
- The PCS100 UPS-I uses energy storage coupled through an inverter to allow the downstream load to ride through very deep sags and short term outages
- The PCS100 UPS-I is an offline system. It is inactive unless the voltage increases by 10 percent or falls by 10 to 13 percent. This enables it to be very efficient, up to 99 percent
- Ratings from 150 kVA to 3000 kVA and voltages 208 Vac to 480 Vac. Download PCS100 UPS-I brochure [here](#)



## PCS100 RPC (Reactive Power Conditioner)

- ABB's PCS100 RPC is specifically designed to condition the current drawn by industrial and commercial loads. The PCS100 RPC uses leading-edge power electronic conversion to inject current into supply, correcting for common problems such as:
  - Unbalanced load current
  - Low order harmonic currents
  - Power factor problems including leading power factor
  - Load current induced voltage drop
- As a purely static device, the PCS100 RPC provides extremely fast correction. Its modular redundant design makes it a very reliable, scalable and serviceable product, backed by ABB's global support network. Packed with new features to suit industrial and commercial applications. Ratings from 100 kVA to 2000 kVA and voltages 380 Vac to 480 Vac. Download PCS100 RPC brochure [here](#)

For more information, please visit [www.abb.com/pcs100-power-converters](http://www.abb.com/pcs100-power-converters) or contact [powerquality.nz@nz.abb.com](mailto:powerquality.nz@nz.abb.com)  
Click [here](#) to view ABB's power protection brochure.

# ABB's power protection portfolio – UPS

## Modular three-phase product range

- ABB's modular UPS product range are high-power, modular and transformer-free UPS systems for organizations who need zero downtime
- The UPSs are built using true online double conversion technology and provide low cost of ownership
- The UPS can be sized to exactly fit your needs and can easily be scaled up to provide 3 MW of clean, reliable power
- Each module contains all the hardware and software required for full system operation. They share no common components and potential single points of failure are eliminated

## Single-phase product

- ABB's PowerValue is a true double-conversion online uninterruptible power supply (UPS) that guarantees up to 10 kVA of clean, reliable power for your critical single-phase applications
- Two units of the 6 or 10 kVA models can be configured in parallel to provide redundancy or to increase the systems total capacity up to 20 kVA
- All units can be fitted with up to four battery modules to extend runtime
- For full flexibility, PowerValue is configurable in tower or rack-mount format. The display is rotatable and therefore easy adjustable to your configuration needs



## Standalone three-phase product range

- The PowerWave 33s exceptional design meets all modern requirements of building and operating energy-efficient and environmentally friendly data centers
- The PowerWave 33 employs transformerless double conversion UPS topology and is available from 60 to 500 kW
- The PowerWave 33 boasts features and options that cater to customer's needs, including the flexibility to accommodate an increase in power requirements and to provide n+1 parallel redundancy
- If additional capacity is needed, up to 10 UPS units can operate in parallel configuration, achieving a power capacity of up to 5 MW

For more information, please visit [www.abb.com/UPS](http://www.abb.com/UPS) or contact [ups.sales@ch.abb.com](mailto:ups.sales@ch.abb.com)  
Click [here](#) to view ABB's power protection brochure.



# Harnessing the power of the ship

ABB converter technology help save 20 percent fuel on ships.



MAN Diesel and Turbo's Alpha Kappel propeller

**ABB has supplied two 875 kVA PCS100 Static Frequency Converters (SFCs) to provide voltage and frequency stabilization on two RO/RO (roll on/roll off) Vessels, Corona Seaways and Hafnia Seaways. RO/RO vessels are transporting large volumes of cargo between Denmark and the Baltic countries and consume vast amounts of fuel oil. Thanks to MAN Diesel and Turbo's technology and ABB, saving on fuel costs by 20 percent can now be achieved.**

#### Contributing factors in lowering fuel consumption

Shipping is hard pressed to continually find new ways to lower the consumption of fuel. This is due to environmental restrictions and high bunker oil prices. MAN Diesel and Turbo worked together with ABB to test whether it was possible to reduce the fuel consumption of the ship by lowering its engine speed. When the propeller speed was reduced, this also reduced the RPM of the shaft generator leading to a lower AC Bus voltage and a lower AC Bus frequency. This resulted in significantly lower fuel consumption.

MAN Diesel's Sales Manager, Christian Wollerup Sørensen, mentioned that a 20 percent saving on fuel consumption is a major advantage within the shipping industry, "There is a lot of money at stake when vessels are bunkering fuel oil, so a saving in the region of 20 percent makes a huge difference".

The technology behind this result was MAN Diesel and Turbo's highly efficient Alpha Kappel propeller design combined with flow optimizing Rudder Bulbs and ABB's PCS100 SFC. The ship's electrical equipment operates on a 50 Hz grid with a voltage of 400 V. In order to maintain the voltage and frequency when the shaft generators speed is lowered to 1500-1260 RPM, ABB's PCS100 SFC regulates the voltage and frequency to 50 Hz with a voltage of 400 V. With ABB's technology in place, this enables the ship's electrical system to carry on working at the same frequency without having to consume additional fuel.

The other contributing factor that lowers fuel consumption for these ships are the new propellers. The propellers weigh in at 10 tons and have a diameter of 5 meters. This is a special designed propeller, designed as an aircraft wing tip and has a bend of almost 90 degrees. Due to this feature, the propeller reduces turbulence around the propeller tip and therefore lowers the flow separation from the pressure side to the suction side of



ABB's PCS100 Static Frequency Converter

the propeller. This collaborative energy efficiency saving solution allows for less fuel consumption per mileage.

#### Putting the design to the test

The vessels had a very small confinement space and a great deal of planning was needed in order to place the transformer and PCS100 SFC into the designated area. For this to happen, a door had to be moved and vents needed changing and steel reinforcements were installed to support the transformer and the PCS100 SFC. Thanks to ABB's compact design, the transformer and PCS100 SFC were able to be fitted into the existing auxiliary engine room.

ABB was also responsible for all the installation work before the ship left the shipyard, which included the expansion of the main switch board with three 1600 A breakers and cabling into the small confined spaces.

#### A good result

Brian from MAN Diesel and Turbo commented about the successful result achieved with ABB and the importance of a reliable partnership. "We have been very satisfied with the cooperation with ABB, and realize the great importance to choose a partner who can provide the best technical solution and providing local technical support at a high level. When we deliver a quality product from MAN Diesel, we need to be 100 percent sure that the quality is accepted by our customer and be sure that our partners can deliver the same level of professionalism and quality".

MAN Diesel's Promotional Manager, Brian Grusgaard, is confident that in the future, ABB and MAN Diesel will be able to continue their relationship and produce good solutions for existing and future customers. "The longer we can drive down the power to the propeller shaft, the higher efficiency and saving of fuel we can achieve. At the same time, there is less wear and tear as a side-effect, because of fewer revolutions. And we have seen throughout the ship - the gearbox, propeller shafts and propeller blades can be optimized to save fuel. The savings are too palpable, proved by the pay-back period".

To find out more about ABB's frequency conversion technology, please visit: [www.abb.com/pcs100-power-converters](http://www.abb.com/pcs100-power-converters)

# PCS100 Product training 2014

Register your interest now for 13-15 May 2014



Enhance your technical ability and knowledge in the PCS100 product range. Receive the benefit of interactive practical training with real devices for demonstration purposes and functional exercises.

**Product training**

**Products, applications, markets and technical basics**

- Power protection
- Frequency conversion
- Grid connect interfaces

**Marketing**

- PCS100 tools and support

**Hardware**

- Power modules, aux.module, interfaces

**Control modes, interfaces, options**

- Power protection
- Frequency conversion
- Grid connect interfaces

**Order handling process**

- PCS100 sizing and pricing

**PCS100 outlook**

- Ongoing and future developments

**Who should attend?**

ABB channel partner sales and service engineers.

**Training locations**

ABB's low voltage power converter product training is conducted in our well-equipped manufacturing and R&D facility in Napier, New Zealand, by highly qualified engineers and instructors.

**Enrolments**

Register your interest for any one of our courses via email to: [pq.supportline.nz@nz.abb.com](mailto:pq.supportline.nz@nz.abb.com)

**Confirmation**

Confirmation of acceptance and course information will be sent approximately two weeks before the start of the course. We will inform you by email or phone if there are no vacant places.

**Course program**

The course program and all related information about the course times and venue are sent to the participants with the confirmation. The course normally runs from 9.00 a.m. - 4.00 p.m. over a three day period.

**Reservations**

We reserve the right to change any course schedules, programs and their contents. A course could be cancelled due to minimal enrolment. The maximum number of students varies between 10 - 12 persons.

**Cancellation**

In the case of cancellation, inform us as soon as possible. This will allow another applicant to attend the course. Your place on a course can be transferred to another person in your company or department.

**Training schedule 2014**

Course	Day one	Day two	Day three
Two	13 May	14 May	15 May
Three	16 September	17 September	18 September
Four	18 November	19 November	20 November
<b>Agenda a.m.</b>	PCS100 product platform overview	PCS100 frequency conversion	PCS100 sizing and pricing tools
<b>Agenda p.m.</b>	PCS100 power protection	PCS100 grid connection	Outlook / future developments

# Service and commissioning training 2014

Register your interest now for 20-22 May 2014

## Your knowledge. Your power.

ABB is a leading supplier of power electronic systems. This extensive experience and history of innovation helps customers around the world to improve plant performance and production.

Our customer awareness means that we are committed to supporting customers globally in their plans for growth. ABB offers a wide range of professional training courses adapted to meet the needs of customers and partner channels.

## Benefits of the training

Service and commissioning training courses give valuable support to increase return on investment, reduce costs in down time and improve skills and motivation of personnel.

Training participants profit from our extensive experience and modern training infrastructures which enable them to:

- Efficiently operate and maintain ABB's PCS100 low voltage power converter systems
- Extend the lifetime of the product

## Training locations

ABB's low voltage power converter product training is conducted in our well-equipped manufacturing and R&D facility in Napier, New Zealand, by highly qualified engineers and instructors.

## Course profile

Our service and commissioning training courses are aimed at qualifying existing maintenance engineers to undergo unsupervised first level support of ABB's PCS100 applications. The main goal of the course is to learn how to operate, troubleshoot and maintain the system.

Upon completion of the course, maintenance engineers will be able to locate and identify hardware components, download fault loggers and important information for first analyses by support personnel, replace parts and perform preventative maintenance. Trainees will gain practical experience using available tools and techniques through organized practical exercises.

## Who should attend?

In order to ensure that the people we train in the servicing of the PCS100 product attain the level of understanding required for field work, it is vital that those attending this training have the following background;

- Work hands on as a Service Technician
- Have a good understanding of three-phase electrical system theory



- Are familiar with the operation and use of relevant test equipment (scope/multi-meter etc)
- Understand the basics of fault finding and can follow direction in terms of testing required by the factory

## Enrolments

Register your interest for upcoming courses via email to: [pq.supportline.nz@nz.abb.com](mailto:pq.supportline.nz@nz.abb.com)

## Training schedule 2014

Course	Day one	Day two	Day three
Two	20 May	21 May	22 May
Three	23 September	24 September	25 September
Four	25 November	26 November	27 November
<b>Agenda</b> a.m.	PCS100 platform service introduction	PCS100 service power protection	PCS100 service grid interconnection
<b>Agenda</b> p.m.	PCS100 platform service detailed	PCS100 service frequency conversion	Outlook / future developments

# Reliable power protection



## Power protection

### 06. Data center dynamics

PCS100 solutions for protecting data centers

### 09. Five reasons to invest in power protection

Its business as usual with PCS100 power protection

### 10. Top five projects for 2013

Around the world with PCS100

### 12. Critical protection

Zero downtime can now be achieved

## Grid interconnection

### 15. A shore connection

ABB's shore-to-ship technology

# Powerful collaboration



## Power protection

### 06. Data center power

A complete data center solution by ABB

### 09. Efficiency in the field

PowerValue 11 RT UPS – for those who value their power

### 10. White gold

Continuous production for Sibur Plastic's main workshop

## Energy storage

### 14. Energy efficiency

Facilitating a research project at the Lodz University in Poland

## Industry focus

### 16. Oil and gas

ABB's solutions for oil and gas



PCS100 Active Voltage Conditioner. Designed for commercial and industrial applications.



By choosing from ABB's PCS100 Active Voltage Conditioner solutions you are selecting from a portfolio of advanced technologies and expertise. This low voltage power protection product has a power rating from 150 kVA to 2.4 MVA. A unique line up giving superior value to operations in the industrial, utility and commercial sectors, providing energy efficiency, high reliability and increased productivity. Visit [www.abb.com/pcs100-power-converters](http://www.abb.com/pcs100-power-converters)

Power and productivity  
for a better world™

