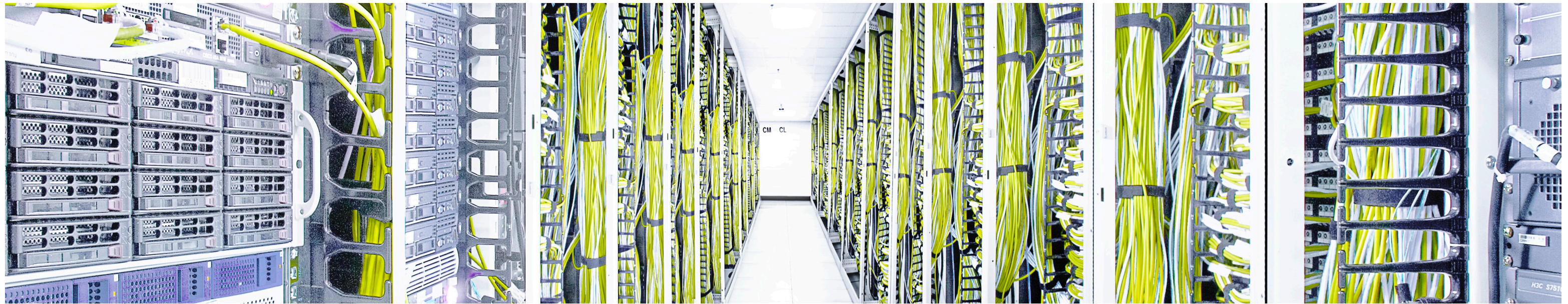


ABB in data centers
Comprehensive products and systems
for your most critical infrastructure



Reliable, efficient, flexible infrastructure for the operability and profitability of your data center

The data center is the most crucial asset for nearly any 21st century enterprise. Therefore, its infrastructure never should be merely pieced together from commercial-grade components. Rather, the data center must be viewed as a coordinated, optimized facility that is built to be an intelligent, highly efficient and immensely flexible operation.

That is why data center designers and developers all across the globe recognize the benefits of relying on ABB as a key partner for their most critical equipment and systems. They benefit from ABB's decades-long record of industrial success in power and mission-critical process automation, which lays an unsurpassed foundation for the comprehensive packaging of data center infrastructure and service for the decades ahead.

While other companies may assemble data center systems from components designed for commercial and office sites, ABB offers inherently reliable, robustly designed and environmentally compatible products and systems tailored to meet the needs of any data center.

The value of ABB systems to the data center operator is evident not only in the quality of individual products but also in ABB's focus on developing and implementing whole systems, from power delivery and distribution to micro-grids and automated monitoring and control of the entire data center system.

This holistic approach ensures that, end to end, the data center's systems are optimized and extensively automated through intelligent facility management software. As a result, operators more readily attain performance goals through data centers that simplify maintenance, enhance reliability, increase safety and reduce the possibilities of human errors.

Data center operators require solutions designed to fit their specific needs, and therefore a supplier with extensive capabilities and engineering know-how can be a valuable partner. ABB serves this role by offering expertise in four critical areas:

Power distribution

ABB optimizes high-, medium- and low-voltage switchgear, advanced circuit breakers, high-efficiency transformers, solid-state transfer switches, digital controls and other products to ensure data centers remain online and operate efficiently.

Intelligent grid connections

ABB has deep domain knowledge of power grid operation, including a special knowledge of renewable energy integration— from substations to smart grids and micro-grids—that reflect ABB's renowned expertise in the utility power industry worldwide.

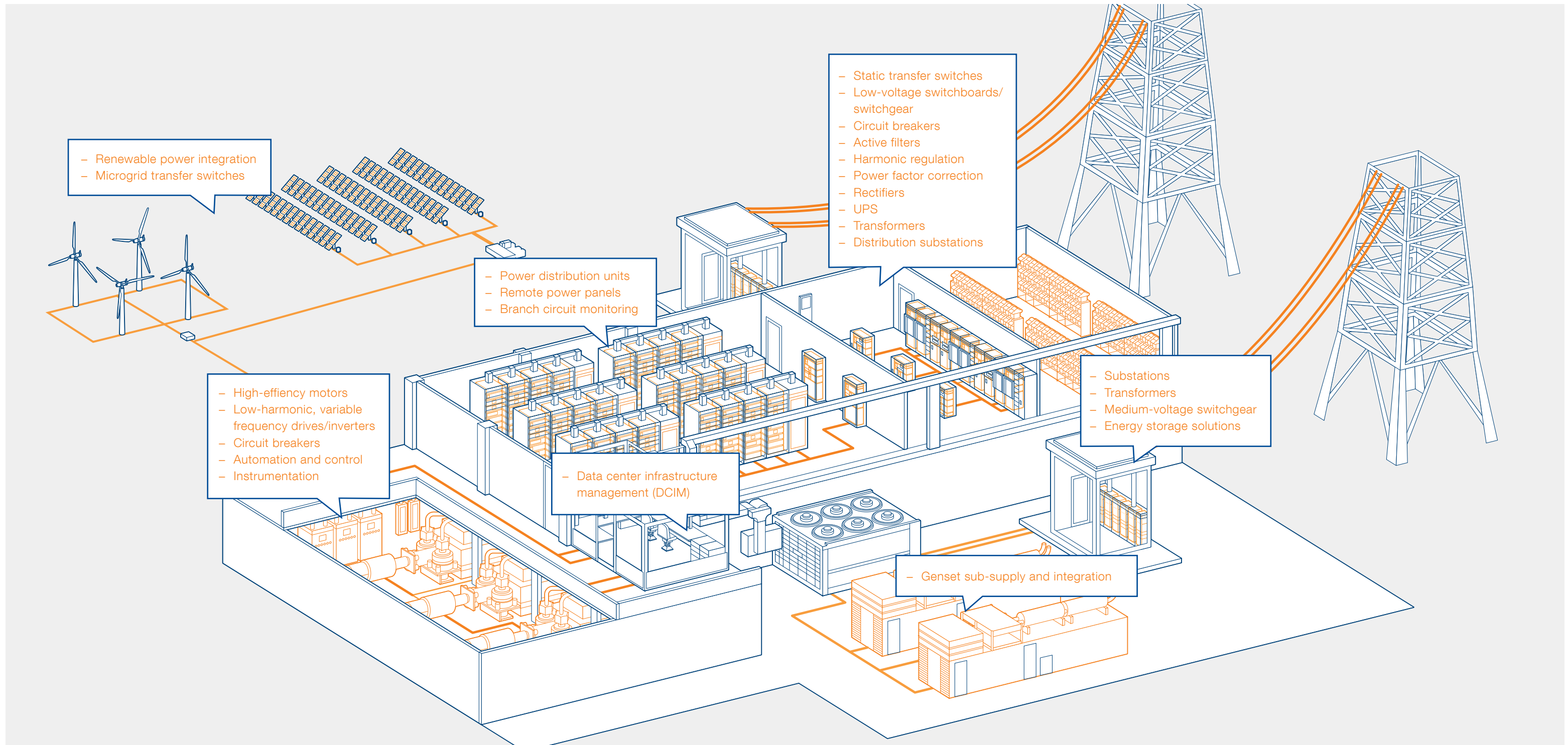
Critical power

ABB provides critical power systems that are built around modular uninterruptible power supplies (UPS) and gensets. UPS modules are used for continuous power protection and can be serviced quickly without disturbing operations. For emergency back-up power, ABB technology enables dozens of gensets to be strung together, eliminating the need for expensive paralleling switchgear.

Data center infrastructure management

ABB Decathlon[®] automates power and energy management; allows intelligent asset and capacity planning; and incorporates alarm management, remote monitoring and other key data center functions.

In each of these arenas, ABB keeps moving, inventing, growing and answering the requirements of forward-thinking data center owners and operators.



Power distribution

ABB provides the products, systems and expertise to help data center operators reliably and safely distribute power and minimize costs through improved electrical efficiencies. ABB power distribution includes:

- Alternating current power systems
- Direct current power systems
- A wide range of low-and medium-voltage products
- Distribution substations

Grid connection

ABB offers the equipment, systems and expertise to reliably connect to the grid and is leading in the adoption of technologies to improve performance with demand-response and energy-trading solutions. ABB's turnkey grid connection capabilities provide:

- Better management of energy demands
- Optimal utilization of renewables and power assets
- Integration into smart grids and microgrids
- Substations

Critical power

ABB supplies quality power products, such as generator sets and uninterruptible power supplies, that are built to withstand the rigors of data center use, helping ensure many years of reliable, trouble-free service. ABB emergency power includes:

- Modular UPS
- Genset sub-supply and integration
- Energy storage systems

Data center infrastructure management (DCIM)

Decathlon® is built on proven industrial control systems that ensure reliability through redundancy and renowned quality, with the flexibility to scale. Decathlon benefits include:

- System availability and performance
- Capacity planning and management
- Resource forecasting and energy planning
- Facility and IT automation
- Troubleshooting and root cause analysis

At the center: Power distribution

ABB's wide-ranging experience in the industrial sector has been fundamental to its reputation for extremely reliable, robust and environmentally sound data center power distribution systems. ABB has built power distribution architectures for almost every conceivable industrial application, with implementations around the world, and can design, coordinate, implement and commission a full range of data center distribution systems and subsystems in a single package.

The foremost goal in power distribution is to provide the highest reliability with improved energy efficiency and cost savings. In recent years, the growth of big data, digital devices and digital sources pouring petabytes of data into data centers has elevated concerns about energy efficiency and carbon footprints to unprecedented levels. From its background with industrial enterprises, ABB has far-reaching experience and can help address these issues. While the increasing emphasis on cost, environmental sustainability, energy and cooling efficiency may be new to the data center segment, it is not new to ABB.

Innovations for the data center address these challenges. For example, ABB's intelligent switchgear offers concurrent maintainability: individual elements of the switchgear panel board can be maintained while the system continues to operate without taking the data center offline, thereby maximizing efficiency and improving reliability.

ABB helps enterprises uncover new ways to achieve a given performance level within a particular standard design, and by looking at the entire power distribution chain, ABB optimizes the whole system. Optimization becomes difficult or impossible when engineering companies assemble isolated pieces and subsystems acquired from multiple vendors who do not maintain a holistic view of the operation of their products in relation to others in the center. ABB provides all the data center's power distribution systems and subsystems, ensuring one cohesive design to optimize cost while maximizing performance.

ABB's power distribution systems are built on a long history of reliability, robustness, sound design and safety with utility and industrial customers. Moreover, ABB manufactures these top-quality systems globally, and has expert teams that understand local codes and standards in every geography.

Additionally, ABB is making strides to advance direct current (DC) products that, when used appropriately alongside alternating current, can simplify data center operations, reduce equipment and energy costs, and build a data center environment that is both more compact and flexible. In fact, ABB has installed the world's most powerful DC data center in Switzerland at the Green Data Center Zurich-West facility, which earned Europe's notable Watt d'Or award for the scale of the energy savings achieved through its pioneering use of DC technology.

In these and other areas, ABB research has adopted an open-minded approach to look beyond the current state of data centers and to prepare for ongoing change with relentless innovation.



Intelligently connecting to the grid: From substations to smartgrids

With more than a century of experience with the utility industry and in connecting the world's industries to power sources, ABB is an expert in substations and grid connections; and its technologies for air-insulated (AIS), gas-insulated (GIS) and hybrid switchgear provide a high degree of reliability, safety and ease of maintenance.

In advancing its grid initiatives, ABB has successfully implemented bi-directional microgrids as well as utilized renewable resources including wind and solar. For data center applications in development, this would allow power flow to the data center from the external grid and direct excess power to the grid from the data center's assets such as renewable resources and even conventional emergency generators. This approach also enables delivery of power to and from distributed systems, creating a multidirectional grid.

With these considerations in its designs, ABB can offer advanced micro-grids that enable data centers to use local generation sources and energy storage systems—such as flywheels, fuel cells and battery storage technology—to ensure reliable supply of electricity to the center. This capability allows the data center to be islanded from the utility company and to supplement the grid itself, transforming the data center into a revenue generator.

In combining smart grids with the Decathlon DCIM solution, ABB can optimize the data center based on the actual dynamic data that the IT equipment provides. This impacts grid management, electricity pricing and the way that energy is distributed, all of which are tied to the IT load that will appear in the next designated time period.

ABB's experience within the utility industry translates to a significant understanding of how power systems operate, how grid stability can be maintained and, how systems can be restored. This detailed knowledge, coupled with a comprehensive understanding of data centers and large enterprises, as well as technology innovation and optimizing operations, makes ABB the global leader in grid connection technology for data centers.



Ensuring continuous operation: Critical power

For continuous power protection, ABB offers uninterruptible power supply (UPS) installed inside the data center itself. The ABB modular UPS offers exceptionally high efficiency and flexibility. Safe-swap modularity means servicing is fast and can be carried out while the data center is in full operation. Simply unplug one module and replace it with another in minutes, without interrupting operations.

The UPS is always available and can be scaled up to provide megawatts of power. Designers no longer need to over-specify configurations because modules can be added as needed. The result is flexible capacity that produces the lowest total cost of ownership.

A vital portion of the optimized data center infrastructure systems offered by ABB is its emergency generator (gensets) solutions. The genset is a core around which the entire emergency power system is engineered, incorporating switchgear, controls and other technologies.



ABB's Conceptpower DPA 500 is the only modular UPS on the market that can easily scale up to provide 3 MW of clean, reliable power.

ABB is renowned for its ability to engineer and integrate gensets into data centers. We have built our industrial expertise into gensets that can be operated in a string of as many as 32 units without needing paralleling switchgear in many cases. The circuit breakers protecting each generator already are on board, so connecting the special control devices with an Ethernet cable creates a multi-genset platform that can be integrated with the power distribution system. This system is highly flexible, easy to program and customizable for various modes of operation.

Applying learning from other industries, ABB also is introducing alternative sources of emergency power into the data center including fuel cells, flywheels, battery storage systems and photovoltaics.



ABB provides integration expertise in supplying gensets from several global partners that ensure maximum performance and mission critical reliability.

The whole enterprise: Data center infrastructure management

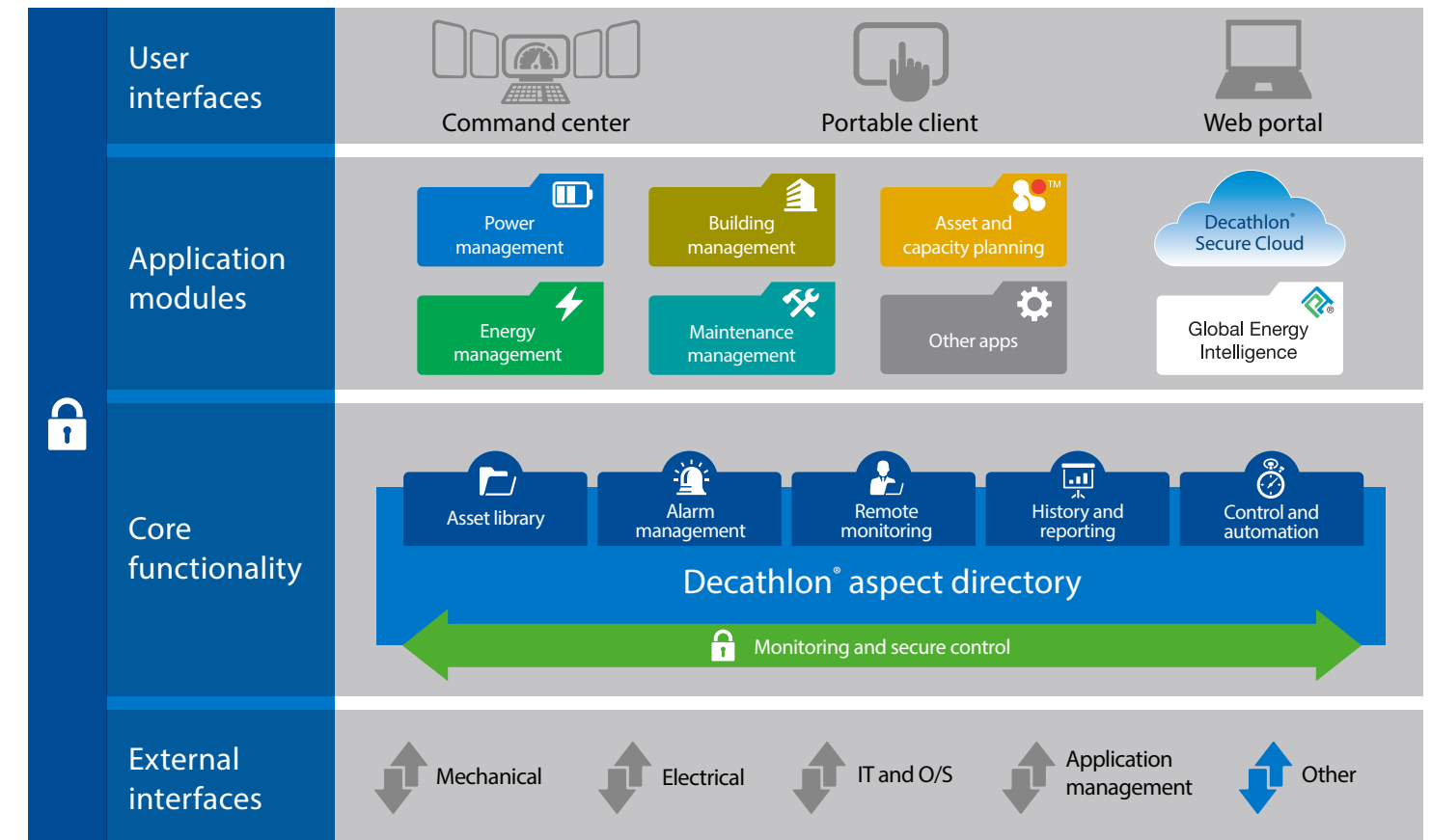


ABB Decathlon® data center infrastructure management (DCIM) is an approach to optimizing entire enterprises that is inherently different from building management systems (BMS), which are less comprehensive.

Decathlon is built on precise, powerful, proven industrial control systems, ensuring reliability through redundancy and renowned quality, as well as a flexibility to scale for the most ambitious vision. By relieving data center managers of time-consuming tasks and furnishing them the system intelligence required for decision-making, Decathlon automates energy and cooling management; asset and capacity planning; alarm management; remote monitoring; and other key data center functions.

Rather than attempting to force-fit an array of proprietary software applications into an infrastructure management system, Decathlon's technology integrates every aspect of data center monitoring and control into a unified, open platform.

Decathlon enables data center administrators to predict future needs at any point and to analyze real-time pricing and capitalize on opportunities for demand-response load shifting. Decathlon also can execute trades and takes advantage of dynamic pricing to ensure the data center is obtaining the most efficient rate for electric power.

Other DCIM systems cannot compare to Decathlon's scope, accuracy, intelligence and reliability. Decathlon incorporates control technologies and process automation of workflow, asset management and automatic demand response in facilities for power and cooling and in IT for load shifting.

A crucial feature at the heart of Decathlon is its ability to troubleshoot and analyze root causes. In conjunction with sensors and other monitoring devices, Decathlon provides granular performance detail, including time-stamping and root-cause analysis, incorporating occurrences of alerts and alarms for the entire data center.

ABB Decathlon helps simplify the operation of data centers, control their systems and capitalize on opportunities to reduce costs while enhancing performance.

ABB core offerings

Providing high quality for your most critical components

ABB supplies a wide range of equipment and complete systems for data centers around the world. Working with a single partner to supply all your most critical systems and components provides a substantial advantage to data center operators in terms of reliability, maintainability and scalability. ABB customers gain the benefit of a totally optimized infrastructure, with every system designed to be efficiently integrated with its counterparts.



Low voltage equipment
AC and DC systems designed for safe, reliable and low life cycle cost power distribution



Medium voltage equipment
A wide range of air and gas insulated switchgear from 1-40kV



High voltage equipment
A full range of products up to 1200kV providing reliable, efficient, high quality power



Low voltage components
A full line of high quality products from breakers and switches to modular DIN-rail products



Motors
ABB offers direct drive and belt- or gearbox-coupled motors for use in HVAC and pumping applications



Variable frequency drives
Standard and low harmonic AC and DC drives for a wide range of applications



Distribution substations
With 100 years experience, the world leader in turnkey air and gas insulated substations



Power transformers
A complete range of power and distribution transformers for indoor or outdoor use



Dry transformers
Environmentally safe, suitable for indoor and outdoor use, available up to 10/25 MVA



Cyberex® from Thomas & Betts
Products include digital static transfer switches, power distribution units, remote power panels and UPS



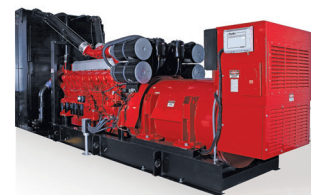
MNS motor control center
Up to 4,000A horizontal bus and 1,600A vertical bus, designed to address the causes of arc flash



Safety components
Products include protection relays, arc-flash detection and prevention and surge protection



Uninterrupted power supply
ABB offers highly efficient, scalable, modular UPS systems up to 3MW



Generators
ABB works with top manufacturers globally to provide a full line of standby, primary and peak-shaving gensets



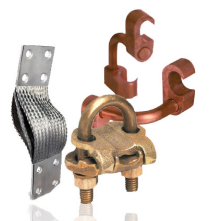
Decathlon® DCIM
Decathlon gives visibility and support into all mechanical, electrical and IT systems



Power quality
Solutions include harmonic filtering, power factor correction and active voltage conditioning



Measurement products
Instrumentation products and analytical solutions to actuate, measure, record and control



Construction products from Thomas & Betts
Construction products include grounding, bonding and connections, framing and cable support

Industrial design provides mission critical reliability

Components for every segment of the marketplace

For design and engineering firms, OEMs, and enterprise data center owners and operators, ABB can be an exceptionally valuable partner. Our offerings are available to all segments of the marketplace, supplying everything from substations to LV circuit breakers for electrical energy to motors and drives for cooling. When you consider a partner for data center supply, consider ABB.

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