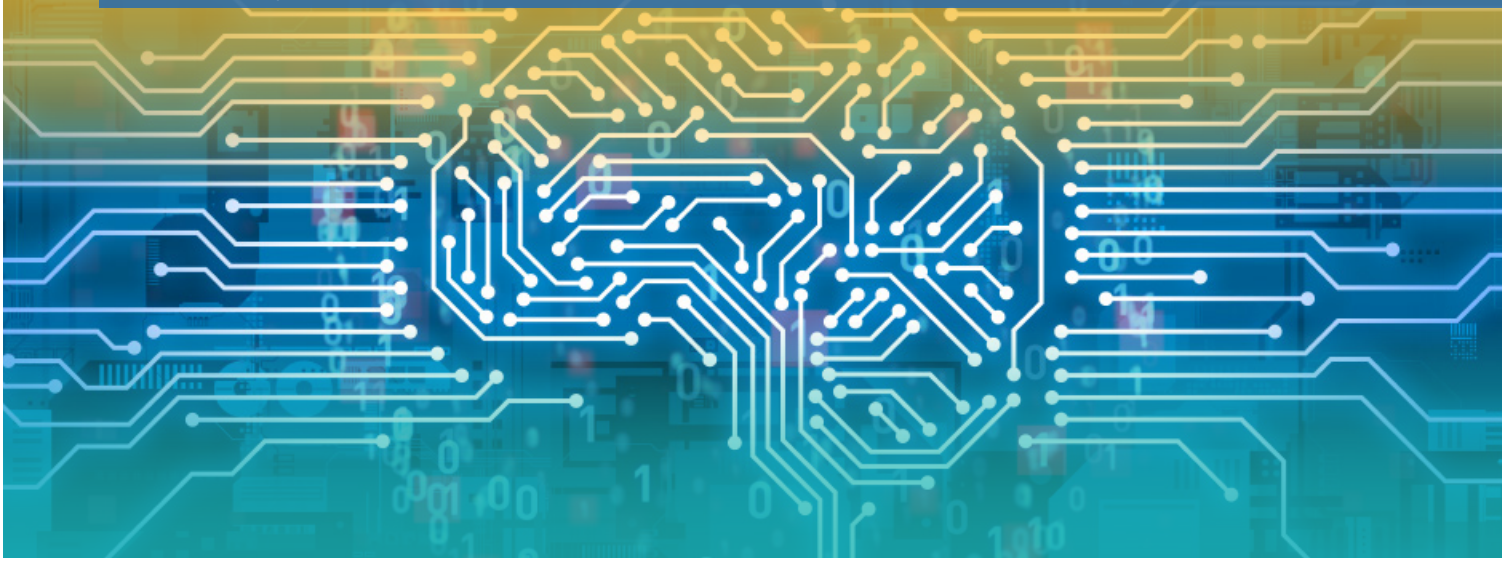
Thought Leadership
White Paper



Relevance of intelligent panelboards and switchboards in data centers

With the rise of big data, edge computing and the cloud, companies are increasingly dependent on data centers for their critical day-to-day operations such as data storage, distribution, analytics and cybersecurity. These reasons necessitate modern data centers be high-performing, cost-effective, sustainable and intelligent with greater reliability and optimized power management.

In the context of data centers, reliability can be defined as the probability that an item of equipment, a system or the whole data center will perform its intended function for a specified period under stated conditions. One way to increase reliability is to use highly reliable equipment and to focus on predictive maintenance to further reduce the probability of failure.[1]

For instance – smart and connected circuit breakers (e.g., molded case circuit breakers and low-voltage power circuit breakers) include electronic trip units, internal sensors, embedded communications and metering capabilities that allow continuous monitoring, health indicators, predictive maintenance and data analytics.[1]

In this paper we will see how the intelligence in panelboards and switchboards helps in driving results.

Powering Business Worldwide

Figure 1. Eaton's Pow-R-Line XD switchboard

The challenge today and how to mitigate it.

Equipment used in data centers such as servers, modems, storage devices, HVAC etc. are sensitive to unexpected disturbances in the power chain and require uninterrupted flow of electricity.

Therefore, data centers depend on panelboards and switchboards to provide essential power distribution while protecting the infrastructure from critical issues including overloads and short circuits.

The need to automate data center operations has resulted in the adoption of intelligent features that enhance uptime by enabling maintenance personnel to monitor the health of the system in real time thereby mitigating critical conditions within the system before they occur.[1]

Intelligent panelboards and switchboards have multiple features and benefits that ensure reliable power distribution in data centers, namely:

1. **Predictive diagnostics** that help uncover, diagnose and mitigate the risk of downtime.
2. **Communication features** such as built-in connections for a variety of protocols which keeps the system connected and the customers informed about the performance.
3. **Energy saving technology** to properly assess energy usage, allowing for effective workload balancing to ensure that the downstream electrical equipment is optimally loaded.
4. **Arc flash mitigation** reduces incident energy levels thereby providing additional protection to maintenance personnel and facilities.
5. **Footprint reduction** with metering integrated into the breaker. Intelligent trip units in the breakers monitor current, voltage, frequency, power, energy, etc. thereby preventing the need for external meters and wiring and creating more space for revenue-generating equipment.

The benefits of advanced circuit breaker technology.

Figure 2. Power Defense molded case circuit breakers, a globally rated platform from Eaton

The global data center landscape is changing, and it requires more automation and embedded use of artificial intelligence (AI) in smart devices.

Rather than representing a futuristic approach, smart and connected equipment is now a reality. It will be up to data center stakeholders and decision makers to implement strategies encompassing automation and the use of AI-enabled analytics to optimize end-to-end resource management, leading to performance and reliability improvement.[1]

As a result, power management companies such as Eaton are launching solutions with intelligent capabilities to serve the needs of the data center facilities.

Eaton has a Pow-R-Line Xpert series of intelligent panelboards and switchboards which has seamlessly integrated Eaton's Power Defense molded-case circuit breaker technology and electronic trip units which can diagnose breaker health issues in panelboards and switchboards and provide predictive insights to customers.

The data collected through panelboards and switchboards can provide insights to improve new and existing architecture and drive new levels of reliability and reduce maintenance. Each device can be accessed remotely ensuring personnel safety.[2] And through a full range of customizable alarms, data center managers can receive remote alarm notifications to reduce potential downtime, equipment damage and other costs. Furthermore, it also incorporates an integral Arcflash Reduction Maintenance System which mitigates the release of incident energy during maintenance.

Conclusion

In summary, intelligent panelboard and switchboards strengthen the reliability and efficiency of data centers – and that is critical because even if less than one percent of critical load is lost, there's a direct impact on the bottom line.[3] Therefore, along with the standard offerings, Eaton also provides customized solutions to its data center customers to meet their specific requirements. Through its satellite manufacturing locations, which are strategically located in 16 cities across the United States, Eaton serves the end-to-end panelboard and switchboard requirements of data centers nationwide – including application engineering and design support.[4]

Intelligent panelboards and switchboards

About Eaton

Eaton is an intelligent power management company with 2022 revenues of $20.8B that is dedicated to improving the quality of life and protecting the environment for people everywhere. By capitalizing on the global growth trends of electrification and digitalization, we're accelerating the planet's transition to renewable energy and helping to solve the world's most urgent power management challenges. 2023 marks Eaton's 100th anniversary of being listed on the New York Stock Exchange.

For more information, visit **Eaton.com**

References

[1] Improving resource efficiency and reliability of Data Center power infrastructure

[2] Intelligent circuit protection for panelboards and switchboards

[3] Molded case and low-voltage power circuit breaker health

[4] Eaton regional manufacturing capabilities are a game-changer for colocation provider

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1000 Eaton Boulevard
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Printed in USA
Publication No. WP014010EN / GG
May 2023

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