

Electrification goes MindSphere: Power Distribution in the Internet of Things

Electrical power distribution is changing – just like the whole energy system. Influencing factors are changed load conditions, a growing number of electric consumers and – most importantly: an increasing level of networking and automation in industry, buildings and infrastructures. Additionally, there are stricter standards and increased requirements for company-internal energy management. As a result, the planning and operation of electric power distribution become increasingly complex and the technical requirements for the systems and products ever more demanding – in particular in terms of flexibility, communication and integration capabilities.

Automated production processes in particular are now characterized by complex technical requirements. In order to adequately support dynamic, networked production environments, a seamless interaction between hardware and software with a systematic data management is essential. The same also applies for electrical power distribution in digital factories. The relevant systems and devices in automated environments are connected via multiple integration, which takes all phases of the value-add chain into consideration:

1. Automated engineering

During the electrical planning, long before the actual construction of an industrial control cabinet, for example, automated and highly efficient control cabinet engineering can simulate the interaction between electrification and automation components for virtual testing. Errors that would occur in the real world can be found and eliminated right from the start. This requires relevant planning and configuration tools and the availability of all relevant product data, including macros for eEngineering systems, 3D models and circuit diagrams. Siemens makes available data for automation and low-voltage components via a central database to allow software-based engineering. The database provides all relevant information:

Available are up to twelve data types per device, which can be flexibly compiled online in a CAx shopping cart for download. The data can be used in a variety of configuring tools, including EPLAN Electric P8. Electric planers can therefore save up to 80 percent of costs for planning, configuration, construction, documentation, ordering and commissioning.

2. Failsafe power supply

System and component availability has never been as important as now, where everything is closely interlinked. The failure of one single element of the production process can as a worst case scenario take out the entire system and stop the whole production. In terms of the low-voltage power supply, a needs-oriented protection concept can prevent failures – complete with interlinked components for consistent protection for all systems and machines. The electrical power supply must additionally be able to respond to automated production processes with high flexibility. Protection devices like 3VA molded case circuit breakers from the Sentron portfolio by Siemens will guarantee both: the necessary safety and maximized flexibility. They protect lines, devices and industrial plants against damage and failure by safely disconnecting the power supply in case of faults like short circuits or overloads. With over 500 available accessories, they can be variably configured to handle operation-critical tasks like the capture of power data.

3. Integration in comprehensive energy efficiency concepts

Communication-capable devices like the TÜV-certified 3VA molded case circuit breakers and 7KM PAC measuring devices form the technical basis for the integration of electrical power distribution into automated environments. They capture power data and create transparency across all system states and consumption values – and therefore provide the basis for efficient and safe production processes and a company-internal energy management system in accordance with ISO 50001.

The data analysis results offer the means for an assessment of system states and network quality and will furthermore allow an optimization of energy consumption and capacity utilization. Possible analysis results can, for example, allow insights into the energy consumption per day, per shift, per production line or per production unit. A comparative analysis of energy consumption during production times and non-production times could help identify previously untapped savings potential.

System comparisons for procedures or processes within one plant or across all manufacturing locations are also possible.

4. Industrial automation integration

The 3VA molded case circuit breakers and the 7KM PAC measuring devices from the Sentron portfolio are fully integrated in the TIA Portal V14. Electrification therefore becomes an integral part of the automation solution. Standardized interfaces ensure an efficient interplay of all components within the industrial communication network. The devices can be configured and put into operation directly via the TIA Portal. The result is consistent engineering with just one single tool and an intuitive configuration of the power distribution within the automation environment. Status monitoring and the capture of power diagnostics data become easy and the electrical power distribution can be adapted flexibly to automated operating, machine and process workflows. In addition, current, voltage and power data can be used for detailed analyses in production automation. System faults are identified early, downtimes are prevented and overall operations become more energy efficient.

5. Connection to cloud-based IoT operating systems

MindConnect components allow the provision of captured power data for MindSphere, Siemens' cloud-based IoT operating system, which makes the information available for specific analyses. The precise, reproducible and reliable measurements for current, voltage, power and energy form the basis for systematic power and system monitoring. MindSphere helps boost performance by capturing and analyzing large volumes of data. It opens the door for enormous savings potential for companies and is the basis for sustainable company-internal energy management in the digital age.

This Backgrounder is available at www.siemens.com/press/hm17

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