Success Story:
Automotive Industry

Markets Served
Automotive

With our measuring kit we are able to support the innovation process in automotive production at a critical point.

William Oomen, Global Segment Manager Automotive, Electrical Sector, Eaton

Full Speed Ahead for Energy Efficiency

Location:
Germany

Segment:
Automotive

Problem:
Measuring system for logging the energy consumption of individual process steps in automotive production

Solution:
NZM3-XMC-MB measuring and communication module combined with the necessary accessories in the NZM-XMC-TCP-KIT-630 measuring kit

Results:
An easy-to-install measuring kit that reliably and precisely provides all the data required for evaluating the energy consumption in the production process

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Background

Energy is an expensive commodity and energy efficiency is the buzzword that is now talked about everywhere. The development of combustion engines with the minimum possible amount of CO_2 emissions or the reduction of vehicle weight through intelligent design and the use of lightweight materials are only two of the solutions that are searched for in the automotive industry. In order to further improve the energy balance of their vehicles, a major German manufacturer is also working on the reduction of the so-called "gray energy" that is also used in the production process. Eaton's NZM3-XMC-MB measuring and communication module for circuit-breakers and switch-disconnectors is being used to document energy consumption in individual production steps. This consequently further optimizes the manufacturing process effectively, making it the most environmentally-friendly car manufacturing process in the world.

The automotive company bases its production on a modular system in order to ensure greater efficiency in the manufacturing process. In future several models of its brands will be assembled with new front and rear vehicle modules, which allow combinations from different wheelbases and track widths. The benefits of the modular system are obvious: The further standardization of components, dimensions and production processes enables costs and manufacturing times to be reduced. In future it will also be possible to produce several different models on the same assembly line.

Challenges

The introduction of modules also brought with it the introduction of the Modular Production System, which standardizes production at the various plants. This also has considerable benefits since plants will look almost identical as a result. When new production sites are built, this will also mean that the production experience gained previously can be transferred very easily.

This also gave rise to the idea of innovative energy measurement in automotive production. This documents the energy demand of individual production steps and makes this information available to the PLC in the automation unit in direct relation to the produced quantity. The aim is to identify energy intensive production steps and to then optimize them as a result. Commonly available measuring systems for this have consisted to date of current transformers for each phase, a measuring device with a display, the wiring of the voltage tap-off with the appropriate protective devices, an S0 interface and a bus interface. However, the car manufacturer was on the lookout for a solution that reduced the device and installation effort and allowed simple and straightforward mounting. It was impressed by Eaton's XMC compact measuring and communication module, which combines the

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functions of voltage tap-off, instrument transformer and communication in a single device.

Solution

By dividing the functions of protecting and measuring in separate devices, optimum flexibility is maintained for selecting the most suitable protective device in terms of technology (electronic, thermomagnetic) and supplier. The XMC is a measuring system that provides all the relevant "energy information": Phase currents and neutral conductor currents and rms voltages are provided as well as active, reactive and apparent power and energy, or the power factor cos ϕ. This provides the required transparency, in order to analyze energy consumption and network quality, optimize them in subsequent steps and thus reduce costs. The values are not only available onsite but can also be forwarded via ModbusTCP to the infrastructure department in order to store them in an SQL database. The concept is so modular that other Ethernet protocols can also be offered.

The installation couldn't be simpler: The main current paths are routed through the XMC and are connected as required inside the device with an insulation piercing screw so that any complicated wiring effort with the required protective device is eliminated. This unconventional idea ultimately impressed the decision makers as a clear benefit.

At the car manufacturer's request, Eaton provided a ready to connect module kit based on the XMC and containing the complete connection technology as well as the measuring system: "As a standard size for the circuit-breaker is always used in the body shell manufacturing project, we were able to specify all the accessories required for the measuring kit, even the cable lug," Rainer Menden, product manager for circuit-breaker communication at Eaton, explained. "Our customers benefit from the fact that the entire measuring kit can thus be ordered with a single article number so that a standard delivery is possible."

The independence of the system from the design and type of the switch is another part of the success: This ensures a large application range as well as the possibility to retrofit existing installations.

Results

The NZM-XMC-TCP-KIT measuring kit is ideally matched to suit the requirements of the car manufacturer: The data required for evaluating the energy consumption of a production process is provided reliably and precisely, thus enabling its energy optimization in a subsequent step. "We are thus able to support the innovation process in automotive production at a critical point," William Oomen, Global Segment Manager Automotive, Electrical Sector, states delightedly.

William Oomen, Global Segment Manager Automotive, Marketing, Electrical Sector, Eaton Corporation

NZM-XMC-KIT-630

The mounting kit is 3-pole and contains the NZM3-XMC-MB measuring module and the appropriate termination from the circuit-breaker to the terminal.

Besides a variant with a digital S0 output, the NZM-XMC measuring and communication module is also offered with a MODBUS interface.

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