



MONITORING THE CHARGING STATIONS OF THE E-BUS FLEET OF THE CITY OF JENA

How Jena's public transport system monitors its charging columns for the e-bus fleet and uses advanced diagnostic features to increase availability and optimize maintenance activities.

In the city of Jena, electromobility has been present in the form of a tramway in service for 120 years. Supplemented by a fleet of diesel-powered buses, an efficient public transport system has been created over time. Last year saw the introduction of e-mobility in the operation of city buses as well.

Three first vehicles started regular service in 2020 to contribute to CO2 savings (53,000kg per bus and year), but also to reduce particulate matter and noise emissions in the urban area.

The attractiveness of public transport is essentially promoted and maintained by smooth and punctual operation. In this context, operations of tramways in particular require a reliable and uninterrupted power supply, which is the responsibility of the power supply department at Jenaer Nahverkehr, operator of the city's public transport.

Nevertheless, malfunctions of the system technology can occur in rare cases. In order to minimize the effects of malfunctions on the operational process as well as on the passengers, it is necessary to keep downtimes as low as possible. This is supported by a reliable control and telecontrol system implemented on the basis of the PcVue SCADA software.

For many years, Actemium Germany's Automation Frankfurt business unit has been the partner of Jena's public transport system for the implementation and further development of the control and telecontrol technology for the power supply, but also for the monitoring of signaling and safety systems.

Maintenance of the newly introduced charging infrastructure for the electric buses fell under the responsibility of the Power Supply department, and the desire arose to integrate the chargers into the control system. Actemium Automation Frankfurt was commissioned to do this.

The primary goal of this expansion is remote monitoring of the charging infrastructure by the power supply department so that any faults that occur can be detected and eliminated as quickly as possible. And to do so while reducing travel times for service personnel as much as possible, especially in a city that, due to its topography and its location within the Saale Valley, has a high traffic density on a small number of routes.

With the existing control system, the possibility of processing the data for visualization, archiving and data exchange with external systems via various industrial communication protocols, as well as remote alarming, is already provided as standard.



BUSINESS OBJECTIVE

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OCPP- DRIVER FOR COMMUNICATION WITH CHARGING STATIONS

Typically, the open standard protocol OCPP (Open Charge Point Protocol) is used for monitoring e-charging stations, which ensures the interoperability of products from different manufacturers.

With its latest PcVue version, the manufacturer ARC Informatique provides a communication driver for the OCPP protocol that supports the current protocol versions 1.6-J and 2.0.1 as well as the security profiles 1 and 2. The software also overcomes a typical OCPP problem, which is that a charging station can only communicate with one Charging Station Management System (CSMS). Using a proxy function, the charger's OCPP messages can also be passed on to third-party systems. This represents a typical feature of the open PcVue system, which inherently has a wide range of data exchange options.

INTEGRATED OPERATING FUNCTIONALITY

A newly added entry point into the user interface that is seamlessly integrated with the existing system, is a map display that shows the charging stations distributed throughout the city area as symbol markers. The newly added part of the visualization benefits from a very short learning curve for users who have been familiar with the existing functions and operating philosophy of the control system for years, and which is also reflected in the charging station monitoring area.

DATA ANALYSIS AND MONITORING

The central function of the implementation by Actemium is alarm and log data management, which allows precise fault analysis in live operation as well as in the evaluation of historical data. The alarm system enables the on-call service to diagnose the fault in advance via the secure remote access of the public utility company and then to rectify it or initiate appropriate measures.

In addition, the traffic control center benefits from the connection to the charging infrastructure. The dispatcher workstation there shows the whereabouts of a bus at the corresponding charging points in real time and points out faults that affect operation. This means that adjustments can be made quickly in vehicle deployment planning to avoid cancellations or delays in the route schedule. Afterwards, the maintenance personnel can determine the actual cause.

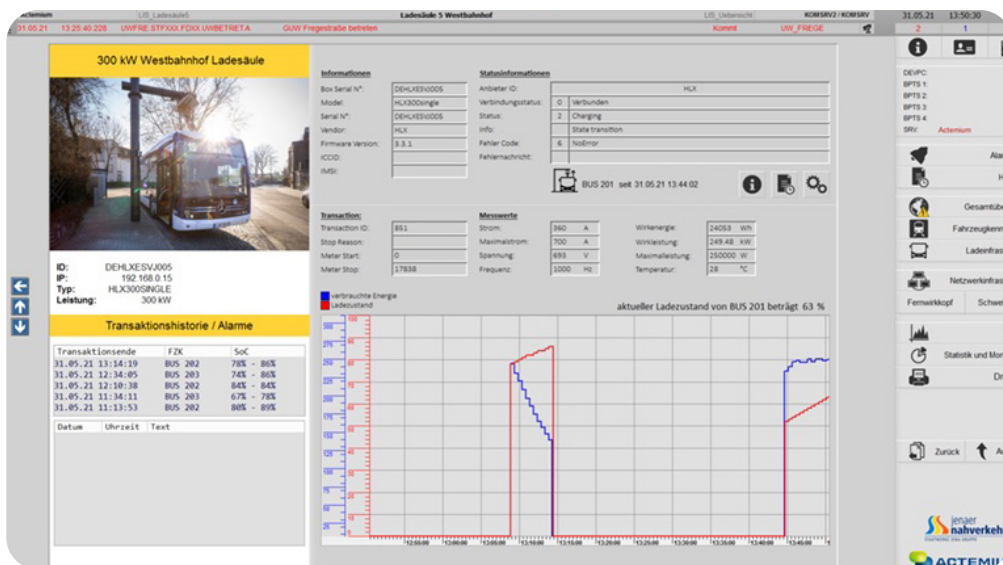
Alarms of particularly high priority are sent as remote messages to the mobile terminals of the on-call service.

The users of the system can monitor active charging processes via a trend data display, whereby all measured values, such as currents, voltages and power values of a transaction, can be visually compared. Likewise, already completed charging processes can be called up from the transaction history and viewed in retrospect, as well as compared with each other. The respective vehicle is identified and its current state of charge is documented.

The transaction history is exported at the push of a button or automatically and stored as a weekly and monthly report. Of particular interest is the respective energy consumption per vehicle and charging process, but also the number of incorrect transactions.

The implemented user interface of the system further enables:

- An access management system for charging stations
- Lock or unlock charging stations for use
- Remotely activate or cancel charging processes
- Store and retrieve charging station-specific documents.



PRACTICAL BENEFITS PROVEN AFTER JUST A FEW WEEKS

Christian Zeh, a testing and maintenance engineer at Jena's public transportation system, is enthusiastic about the solution:

"By integrating the monitoring and control system for e-charging stations, all operating states are now visible in the control system, which opens up immediate intervention options for us. The charging infrastructure is thus fully integrated into the operational workflows of the power supply department. The usefulness of the system was proven after just a few weeks in daily operation, especially with regard to controlling temperature fluctuations in the charging stations."

With the implementation of the charging infrastructure in its control and telecontrol system, the power supply team is thus well prepared for the already planned increase in the electric bus fleet and the associated expansion of the charging infrastructure.





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