

Energy data acquisition with Internet connection for buildings

→ Considerations to decrease energy consumption and reduce CO₂ emissions have played an important part in the building management community long before UNO's World Climate Report in spring 2007. In the majority of existing private and commercial properties, the potential to improve has not been exhausted. The Ingenieurbüro Dr. Lauzi (Engineering Consultancy), based in Mainz, Germany, has developed a system for acquiring energy consumption data that fulfils the requirements for modern building management.

The main reason for the poor exploitation of energy potentials is the lack of an accepted database for the users' consumption behavior. Recording devices for electricity, fuel, heating or water are almost always present nowadays, above all due to legal stipulations, but even when these devices have an electrical interface, they work almost exclusively as stand-alone solutions with proprietary hardware and software. This hinders further continuous processing and sometimes even the comparability of recorded data with regard to the lasting management of consumption costs. Simple examples of this are the identification of hidden "electricity hogs" within a house installation or the determination of leaks in the water supply. However, complex optimization work too, such as the hydraulic balancing of heating circuits, can only be accurately and economically assessed by means of the long-term analysis of comparable consumption data.

The Ingenieurbüro Dr. Lauzi has stepped up to fill this gap with a new, modern concept for the acquisition of consumption data – especially for smaller and medium-sized buildings. The controller design is based on the BC9000 Ethernet controller from Beckhoff, which, besides being suitable for use in the widest variety of industrial applications, is also ideal for the requirements of industrial building automation and home automation.

"We decided to use a Beckhoff controller because we needed a product that could be integrated in the overall design together with the widest variety of components and at the same time satisfy our requirements with respect to equipment

and loading capacity," explains Dr.-Ing. Markus Lauzi. "System-related limitations, in particular the size of the non-volatile memory, can be easily overcome by selecting the next-largest product family such as the new CX1010 Embedded PC." The BC9000 is connected to the building's technical network systems via Ethernet. Using DynDNS (dynamic DNS entry) and a VPN-capable router, a direct Internet connection can be established at no extra cost.

With this system, the user is able to:

- | read out and record consumption data from individual measurement points in accordance with a preset program or at any time if need be, whereby the acquisition time interval can be anywhere within a range of minutes to years,
- | carry out password-protected actions, such as correcting or resetting the display values of meters that track consumption and
- | read out collected data along with a local display from anywhere in the world with the aid of proven Internet technology and process it with the aid of a spreadsheet program.

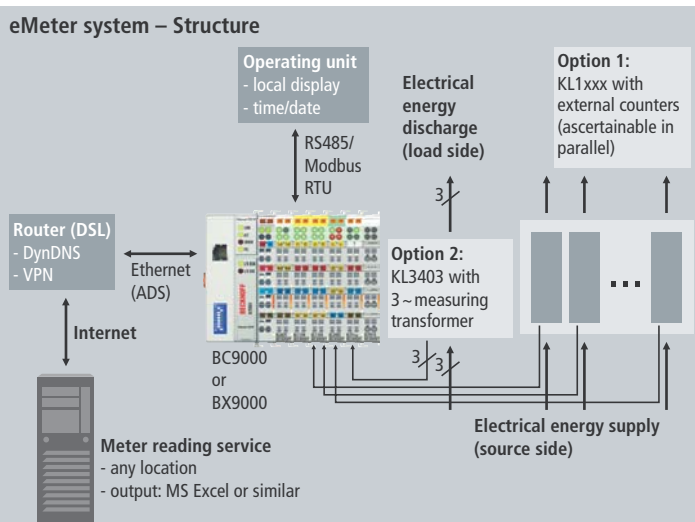
The software, which was developed by the Ingenieurbüro Dr. Lauzi from the requirements of a building administration, is modularly constructed as a "consumption data acquisition" technological function block in the form of an IEC 61131 library.

Simple scaling of the application is always possible. Long-term experience has been gained with several successfully installed systems. Currently, analyses are taking place with, among others, electricity and gas meters connected via a simple pulse interface with digital input terminals. The timebase is provided by an operating device with a two-line display, which is connected via Modbus RTU to the KL6021 serial communication Bus Terminal I/O module.

Direct energy measurement using the KL3403

Additional possibilities are offered by the use of the KL3403 Bus Terminal, a 3-phase power measurement terminal that enables the direct measurement of all relevant electrical data from a supply network, allowing a high precision analysis of the network in conjunction with a measuring transformer. If this system is to be used for cost calculations, all components in the measuring chain must be calibrated by an official body.

The open interfaces of this system allow a combination of the technological function blocks used with additional technical building automation components such as heating controllers. This presents the end customer with the opportunity to create considerable savings via specific analysis of consumption behavior or unknown sources of error.



The core of the energy data acquisition system is a BC9000 Bus Terminal Controller. Due to the high scalability of Beckhoff control technology, CX1010 to CX1030 Embedded PCs or a high end Industrial PC can also be used as the central intelligence for larger applications.

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