

Efficient energy use through the application of intelligent controls

→ Energy conservation has been a hot issue for years and remains very topical. Increasing environmental awareness, resource shortages and rising energy prices keep energy awareness high on the agenda. There is significant potential for energy savings without negative effects on comfort. The key is efficiency. Large energy savings can be achieved with new technologies or with a combination of existing technologies.



Modern homes offer more than the proverbial "roof over the head" – high technical standards and comfort have long since become a matter of course. In the past, energy efficiency was not cost-effective in many cases. Additional expenditure for energy conservation often matched or exceeded the calculated savings. With rising energy costs, the situation is changing: Assuming the price increases over recent years continue, many "green" investments will also make economic sense in the near future. In the simplest case, significant energy savings can be achieved through networking of commercially available components and intelligent controls.

Networking helps save energy

The greatest savings potential is associated with heating systems, which in private households account for approx. 76 % of total energy consumption. For example, the heating can be turned down on the south side of the building when the sun shines through the windows. Without networking with solar sensors, the heating system will only respond once the temperature exceeds the setpoint. The residual heat in the radiator therefore leads to temporary overheating. If the heating system is connected to a solar sensor for the shading system via an intelligent controller, the relevant data can be retrieved and processed. Via Internet access to weather forecasts, the heating system can also operate in forward-looking mode by adjusting itself to the climate data.

Scalable CX control platform

Together with the automation kit, consisting of I/O modules and different gateways, the Beckhoff CX Embedded PC series allows all devices to be controlled directly or networked. Powerful, compact solutions can be created by simply plugging the hardware together with the required signals. The TwinCAT control software integrated in the CX and the Windows operating system offers a high-performance and flexible platform for fast processing of large data quantities via different communication routes. The CX serves as a link between IT, multimedia and video on the one hand and sensors, actuators and sub-buses on the other.

Future-proof, guaranteed

The CX series is certain to be compatible with foreseeable future requirements. Based on tools and software from the PC sector, additional increases in computing power can be expected so the CX will likely be able to handle future integration of video and audio processing, for example. In addition, the CX is highly expandable through add-on modules, i.e. users will be able to maintain system continuity when faced with increasing demands. The continuous development of the Bus Terminal range opens up options for accommodating almost any signal type by adding further flexible components. The internal interfaces developed by Beckhoff are versatile and easy to handle. Future systems can be mapped and integrated in existing solutions. Additional benefits of the scalable Embedded



Controllers include USB and DMI interfaces for straightforward connection of all operator control elements such as LCD displays, mouse and keyboards.

Demand-based lighting

For the Light+Building 2008 fair, the Beckhoff automation kit will be complemented with new I/O terminals and software libraries so that it meets all requirements for advanced, innovative building control based on standard components.

Demand-based lighting, depending on daylight/sunshine, day of the week, day or night-time and occupancy, can be integrated into the Beckhoff system through a range of interfaces. The simplest case is direct connection of a lamp to a dimmer. The universal KL2751 (300 VA) and KL2761 (600 VA) dimmer terminals detect the lamp type and adjust themselves accordingly. Built-in short-circuit resistance simplifies maintenance, i.e. the fuse no longer has to be changed if a filament fails. The dimmer is controlled directly without additional connection cables, switches or parameters.

More sophisticated lighting devices operate with built-in interfaces such as DALI or DMX. The control system can communicate with them through the KL6811 (DALI) and EL6021 (DMX) I/O terminals. A wide range of lighting scenarios can be controlled for maximum energy efficiency and comfort.

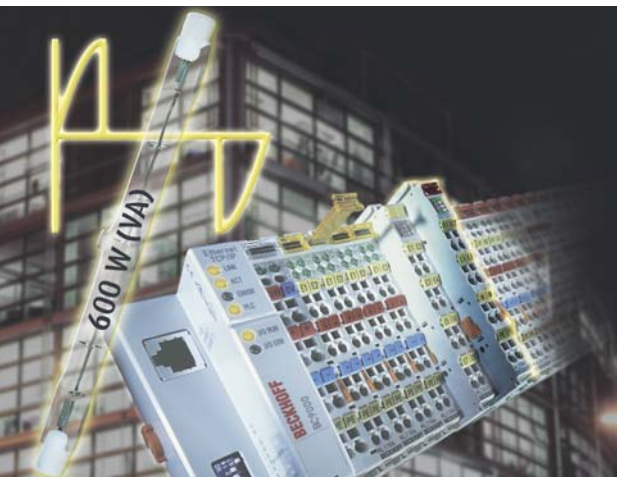
Efficient speed control for pumps and fans

Circulation pumps in older systems are throttled mechanically, resulting in the shifting of the operating point and particularly inefficient operation. A simple control scheme enables the volume flow to be adjusted to demand and the pump speed reduced accordingly. In small heating systems the circulation pump is usually grossly oversized and offers significant savings potential. The logical connection of the pump with the central controller can be easily achieved with the 230 V KL2791 output terminal. This terminal contains power electronics that can vary the speed of a single-phase motor within a wide range (10 % to 100 %). Interrelationships such as external and internal temperature or occupancy and wind speed influence the heat demand and therefore the required volume flow of the circulation pump.

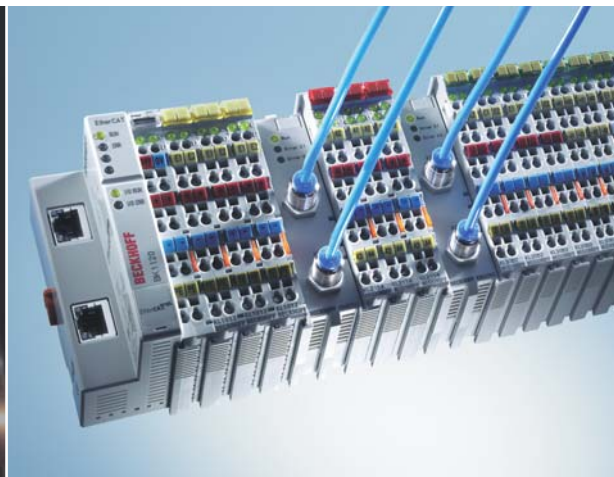
An air demand profile ensures good air quality while saving heating and electricity costs. As for pumps, interfaces between fans and the control system require a certain degree of sophistication. With the KL2791, the software only "writes" a digital value for controlling the capacity.

Pressure measurement directly in the Bus Terminal

The KM37xx pressure measuring terminals measure the volume flow based on dynamic pressure and are able to determine the degree of filter contamination.



KL2761 dimmer Bus Terminal for direct connection of different lighting devices such as incandescent lamps, inductive and electronic ballasts



Pressure measurement directly in the Bus Terminal system: The KM37xx pressure measuring terminals can be used for measuring differential and absolute pressures directly in the I/O system, without additional measuring instruments.



The CP608 Ethernet Control Panel features an integrated PC and is well-suited for a wide range of industrial automation applications. The panel can be used as a simple touch screen panel or as a PC controller.

In this way, operation within the specified limits can be guaranteed. As a result, fewer consumables (filters) are used and energy use is reduced compared with scenarios where dirty filters remain unnoticed for months.

Energy measurement

Exact consumption measurements are a prerequisite for savings and more efficient use of energy. Targeted intervention and performance assessment requires measurement of individual consumers and small groups. In this way, savings potential can be spotted easily, while less promising options are also identified and can be avoided.

The KL3403 energy measurement terminal offers each fieldbus a comprehensive network analysis that can be used for "self-learning" purposes: Switching on and off of equipment is associated with typical energy consumption patterns. Absence of such patterns can be used for fault diagnosis and notification of a technician (via remote maintenance) where appropriate.

User-friendliness

Most devices feature high-performance electronic components for monitoring the desired function. Optimal utilization requires correct parameter settings. Access to these parameters is usually difficult, and operation is complex. Displays are too small, and a small number of keys have to be used for navigating through a whole hierarchy of submenus. For specialists with good product training this may be adequate, but end users will find parameter modifications daunting.

For cost reasons not all devices can be equipped with self-explanatory user guidance and a graphical interface. For economic reasons and in the interest of user-friendliness, central operation is required. Ideally, the networked devices should not all be shown individually at this central point, but consolidated into typical application profiles. Via the "Absence" menu item, the heating system is turned down, the lighting is switched to simulated occupancy, the alarm system is activated three minutes after the occupants leave the house, and the water supply is switched off once the dishwasher has completed its cycle. Of course, the central display can be accessed from any PC via the Internet, enabling remote operation.



Light+Building News

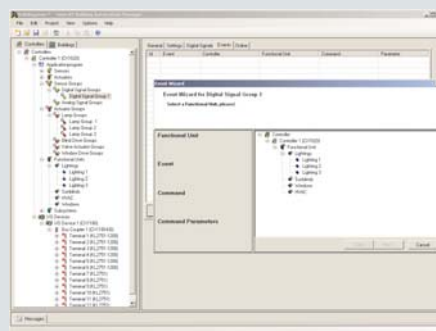
With innovations such as Bus Terminals and TwinCAT libraries, Beckhoff extends its automation kit to offer a complete system for buildings. New Bus Terminals for HVAC and lighting not only enhance functionality and comfort, in combination with TwinCAT they also contribute to improving energy efficiency.

The DMX Bus Terminal completes the lighting control range: In addition to intelligent dimmer terminals up to 600 VA, all standards such as digital/analog, DALI, LED control and PWM are supported.

Building Automation | Maximum flexibility through PC Control

PC-based control technology enables all building functions and function changes to be realized based on software. This means maximum flexibility and low engineering costs. The comprehensive TwinCAT building library covers all main building functions. The new TwinCAT HVAC library contains more than 70 function blocks for automation of heating, air-conditioning, ventilation and sanitary installations. The TwinCAT library simplifies engineering significantly.

"Configuring instead of programming" is the motto of the TwinCAT Building Automation Framework, which facilitates complex building automation without programming knowledge. System integrators, operators and building users can modify scenarios or re-allocate sensors/actuators quickly and conveniently.



"Configuring instead of programming" with the TwinCAT Building Automation Framework