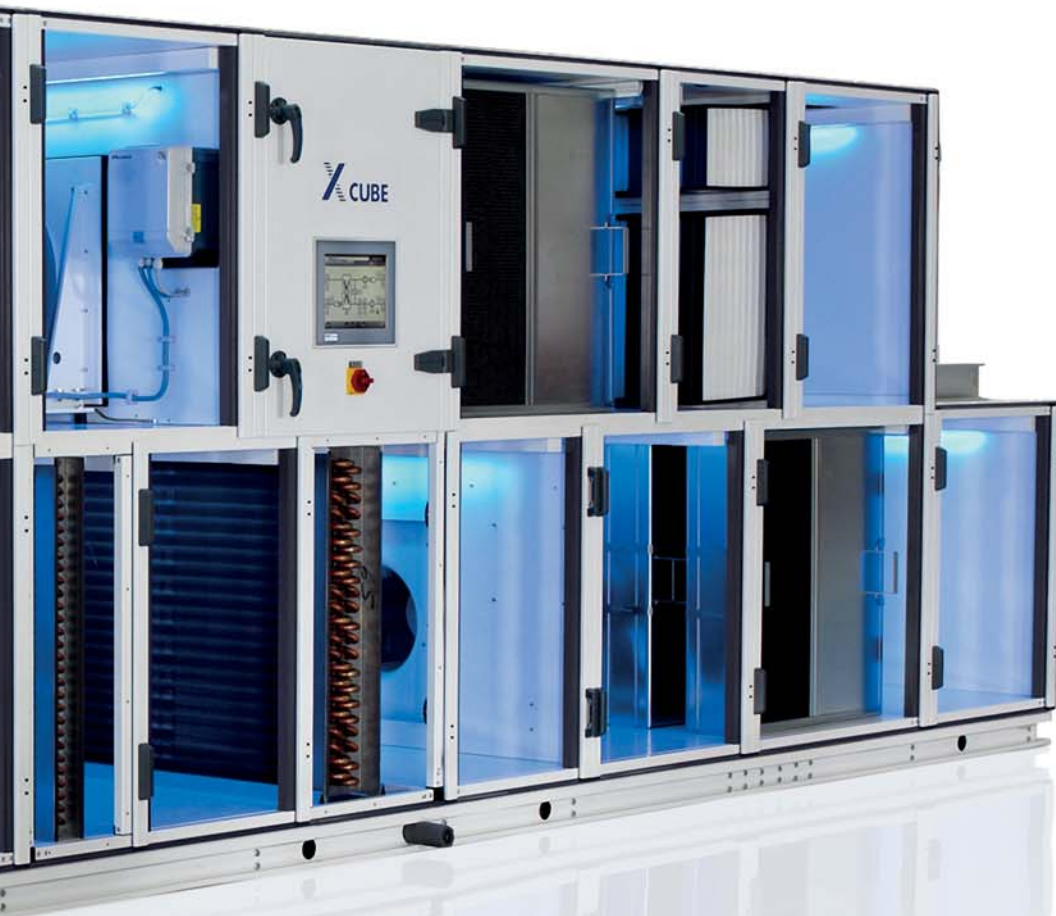




PC-based control technology for smart air conditioning systems

# Embedded PC enables flexible, integrated control solution

The modular design of TROX air handling units enables them to cover a wide range of challenging applications. Flexibility, openness, robustness as well as ease of use and installation are just some of the benefits found with the Beckhoff Embedded PC and TwinCAT control platform implemented within the integrated measurement and control (MC) solution.



The modular X-Cube central air handling unit is freely configurable in terms of width (612 to 4,896 mm for 1 to 8 filter elements) and height (306 to 2,448 mm for 1/2 to 4 filter elements).

Since the founding of the company in 1951, TROX GmbH in Neukirchen-Vluyn, Germany, has developed and produced components, devices, and systems for air conditioning applications, as well as fire and smoke protection solutions. The company's broad expertise in applications for airports, hotels, hospitals, shopping centers, office buildings, and sports facilities is particularly evident in its X-Cube air handling units, which were introduced in 2012. The central X-Cube air handling units are freely configurable and optionally equipped with an integrated measurement and control (MC) solution. Due to the flexibility of their design, systems with flow rates of up to 150,000 cubic meters have already been manufactured. Additionally, with the expansion of integrated MC functionalities in recent years, they are now able to accommodate the company's volume flow controllers and fire dampers, as well.

X-Cubes are available in basic versions for office buildings, sanitary versions for hospitals and labs that meet the German AHU Guideline 01 (RLT-Richtlinie 01), as well as weatherproof versions for outdoor installation. The modular design and minimized wiring through the consistent use of fieldbus technology ensures low installation and maintenance cost. X-Cubes can be configured as supply units, extraction units, or a combination thereof, and arranged side-by-side or on top of each other.

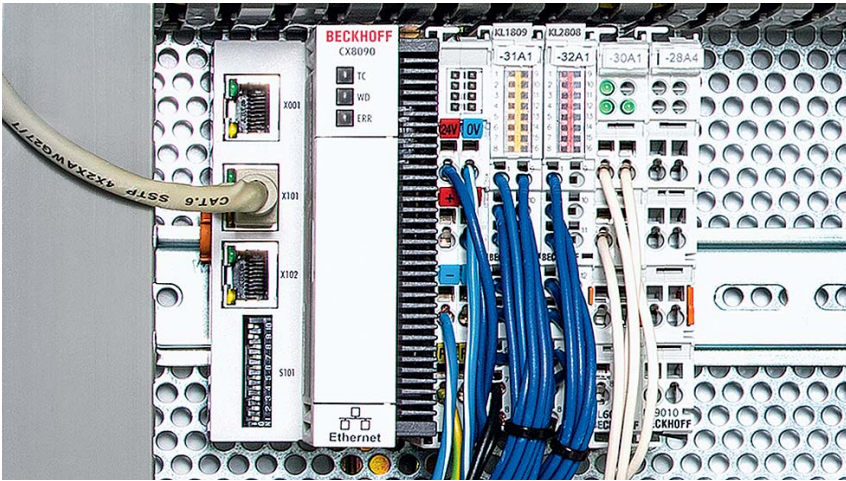
#### **Open control technology for flexible and powerful MC system**

The broad functional requirements of the MC solution place high demands on the processing performance of the underlying control hardware, as well as on the system's adaptability to the respective operating conditions. According





Nine X-Cubes, configured as air supply and extraction units with highly efficient cross-flow plate heat exchangers, ensure perfect conditions in the Buchholz Galerie at all times.



The standard X-Cube controller is a CX8090 Embedded PC. In applications where more processing power or a certified BACnet building controller are needed, a CX9020 can also be used.

to TROX, PC-based control technology from Beckhoff represented the ideal solution.

Flexibility was one of the major objectives at TROX in the conceptual phase for the X-Cube system. Each installation was customized for its specific application in terms of its construction and optionally integrated MC technology, and, since customer requirements vary significantly, the control technology had to be highly adaptable as well in terms of inputs, outputs, and software. The only way to accomplish these goals was through the implementation of a freely configurable and programmable system such as that found with PC-based control. This approach also delivers the kind of openness needed to integrate the MC system into virtually any building management application.

Having a modern communication and wiring concept with bus-based interfaces to actuators and sensors was another important objective. Compared with

conventional systems, a bus-based system could accommodate much more data and require significantly less wiring. Accordingly, each X-Cube equipped with the TROX controller features a specially developed wiring and connector system that makes installation significantly easier.

### **Embedded PC forms the foundation of integrated control solution**

The broad spectrum of X-Cube applications ranges from simple air supply and extraction units to complex systems that include fire dampers, volume flow controllers, and other TROX products. With the modular control system from Beckhoff, TROX can now implement the right solution for any set of requirements, no matter how simple or sophisticated. At its core is an Embedded PC from the CX series – in most cases a CX8090 with a switched Ethernet port. If the client requires a certified BACnet building controller or more computing power, a CX9020 is used. On the software side, the system uses TwinCAT with







In the “Buchholz Galerie” shopping center with a floor space of approx. 8,500 square meters, nine individually configured X-Cube units handle air volumes ranging from 6,000 to 44,000 cubic meters per hour.

the XML Data Server, BACnet/IP, Modbus TCP Server, PLC Modbus RTU, and SMS/SMTP Server libraries.

Even complex systems rarely require more than 20 physical I/Os such as the KL340x or KL440x analog I/O, KL1809 or KL2808 HD Bus Terminals, or the EL6201 AS Interface Master Terminal. The fieldbus-based control system can handle plenty of data points – larger systems with fire dampers, volume flow controllers, and other similar devices can have more than 1,000 of them.

The compact, modular control system handles all basic functions, such as the bus communication with the actuators and sensors, as well as with various modules (for example, humidifiers). It offers diagnostic functions that permanently monitor the components and respond in case of a malfunction. In addition to these internal tasks, the Embedded PC supplies a web-based user interface for device

settings and status checks. The controller’s third task is communication with the building management system.

The most important requirement for designing the TROX control solution was the ability to easily adapt the system’s processing power and number of I/Os to the customer’s specific needs. For more demanding systems, TROX can easily employ a more powerful controller without having to modify the standard software. One critical feature of Embedded PCs is their ability to store software and settings on a standard SD card. It not only simplifies any necessary controller replacements, but also provides an easy-to-handle backup of the unit’s settings and diagnostic data.

Further information:

[www.trox.de/en](http://www.trox.de/en)

[www.beckhoff.com/building](http://www.beckhoff.com/building)