



Always Fresh Air

Location:

Aachen, Germany

Segment:

Building automation

Problem:

exhaust air system in the buildings of the chemistry department of a university urgently required a new concept

Solution:

PKE motor starter with SmartWire-DT, XV100 touch display PLCs, SASY 60i busbar trunking system

Results:

SmartWire-DT increases system availability, reduces wiring in the control circuit and saves time consuming troubleshooting during commissioning and maintenance

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With SmartWire-DT and the PKE motor starter combinations we are taking the ideal approach

Robert Wagner, Wagner & Müller

Background

The exhaust air system in the buildings of the chemistry department of a major German university urgently required a new concept. Thanks to the extensive expertise of the Aachen-based company, Wagner & Müller, it was awarded the contract for its impressive solution concept which included Eaton's SmartWire DT communication and connection system and PKE motor starter combinations. Compared to conventional HVAC building solutions, the new solution is based on high-performance standard components and offers verifiable cost savings.

Challenges

The exhaust air systems of three buildings belonging to the chemistry department of a German university were due for an upgrade. There were several individual problems in opening doors as the supply air system had failed. In all, five systems were designed that had to be commissioned in succession.

Solution

The solution for the exhaust air system includes the use of SmartWire-DT: SmartWire-DT is the seamless connection and communication technology from Eaton. The uniformly designed and open system replaces the control wiring in all components from the circuit-breaker to motor starters and frequency inverters right through to pilot devices. In all, around 500 Eaton PKE motor starters were used in the chemistry faculty, with each one being used in combinations of two starters for small and high exhaust air fan speeds. The two speeds are interlocked by means of both the hardware and the software. Several small rooms or one large one are assigned to a fan, with each fan being installed on the roof of the building.

Each of the five systems of the chemistry department consists of a switchboard (2.60 m wide, 2 m high), each containing an Eaton HMI/PLC – a 7.4 inch touch panel of the XV series with a Profibus DP fieldbus interface – as well as the DOL



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Clarity and convenience: both the operation and the control of the five systems are implemented with a 7.4 inch touch display PLC.



Around 500 Eaton PKE motor starters with a SmartWire-DT interface were used to control the exhaust air system.

starters mounted on the SASY 60i busbar system from Eaton. In combination with the Eaton motor-protective circuit-breakers and circuit-breakers, SASY 60i forms a cohesive, UL certified solution for switching, controlling, protecting and distributing power.

PKE motor starter combinations with PKE connected to SmartWire-DT enable the university to ensure integration in the automation world: The PKE-SWD-32 modular COM interface also provides the actual current flow value of the PKE as well as different signalling functions such as diagnostics, status or overload signals. All process-relevant data is transferred directly to the controller and is made available over the entire system. The data transparency thus created increases the efficiency and operational reliability of the drives in the area of the motor-protective circuit-breaker. The PLC (or a control system) is always provided with up-to-date and precise diagnostics data, and tripping and overload values can also be set for motor protection.

Impressive solution based on standard components

The proposed solution for the chemistry department of the university offers several benefits. The building automation concept is not based on a proprietary island solution but solely on standard components. Any qualified technician can carry out maintenance work on hardware and software, as well as expand the system as required in accordance with the standards. This also applies to the HMI/PLC, since like all of the xSystem product groups, the XV100 series is programmed as a PLC with the CoDeSys-based xSoft-Codesys-2 programming system in accordance with IEC61131-3. Either Galileo or the CoDeSys Target visualization implemented here can be used as the visualization software. Each HMI/PLC of the five systems is backed up by an Eaton 5125 UPS.

The installed solution also allows the university to implement an efficient energy management system. The energy consumption of all motors can be evaluated and all values passed to a monitoring system for analysis.

The exhaust air system is also designed so that if level 2 (high speed) fails, the exhaust air

system can continue to operate via the activated level 1 (low speed).

Autonomous exhaust air system with central control system option

The five exhaust air systems operate independently. They therefore do not require a connection to the central control system in order to operate fully. The control level currently uses Modbus which is connected via a gateway to BACnet. A connection of the SmartWire-DT system via Profibus DP to the central control system is being discussed. This allows the implementation of a central monitoring system, and the SmartWire-DT already provides this option to thus ensure future-proof design. Motor currents of the 250 double drives could not only be monitored in parallel via the SmartWire-DT cable, but the touch panel could also transfer this information to the building control center via OPC.

PKE with pluggable ZMR trip block

Another function offered by the PKZ motor-protective circuit-breaker is the use of pluggable

trip blocks – in this case the ZMR: Combined with the PKZ basic unit, the pluggable ZMR-PKZ trip block with an overload relay function does not initiate the disconnection of the protective circuit-breaker in the event of a motor overload, but switches off the downstream contactors. In this way, the PKZ stays closed and does not have to be manually reset.

Results

Dipl. Ing. Robert Wagner, CEO of Wagner & Müller, sums up as follows: "We presented our proposed concept to the planners at the university, who, even with their extensive technical knowledge, were impressed by our solution. With SmartWire-DT and the PKE motor starter combinations we are taking the ideal approach since our panel not only saves money. SmartWire-DT increases system availability, reduces wiring in the control circuit and saves time consuming troubleshooting during commissioning and maintenance."