

# EVERYTHING FROM A SINGLE SOURCE AT KARLSRUHE HOSPITAL

[□ back to the overview](#)

---

|             |                  |
|-------------|------------------|
| <b>date</b> | <b>rubric</b>    |
| 29.08.2022  | press / projects |

The Städtische Klinikum Karlsruhe hospital has been in existence since 1907. Almost half of its buildings – which are made up of a well-proportioned, listed ensemble worthy of preservation – date from this period. As a maximum-care facility providing medical care close to people's homes, it has an important task.

## **Expansion measures since 2016.**

The current infrastructure was no longer up to date. For these reasons, extensive structural changes were needed and this resulted in about a fifth of the useful floor area being subjected to basic new construction or conversion measures: in addition to the new construction of the institute building and the central cooling facility, the new construction of House M, the future ward block and functional building, was particularly important.

## **Haus M.**

House M. is spread over a total of 21,000 m<sup>2</sup>. Across its seven floors, it will house the hospital's intensive care units and the new central operating area with 20 operating theatres. It will also accommodate a central sterilisation unit, a number of examination and treatment units, the extension to the central emergency department, and the general care wards with 240 beds over two floors.

Level 02 houses large plant rooms, especially for the installation of the ventilation systems for the operating and nursing areas, which are installed in four sub-centres. The exhaust air from the ventilation system is discharged via the roof in separately provided outlet structures.

## **Everything from a single source.**

When KLIMABAU Gesellschaft für lufttechnische Anlagen mbH was awarded the contract for the installation and commissioning of the ventilation and air conditioning systems, including fire protection, as well as the installation of the control technology, the heat recovery systems and the single room control systems for the laboratory area, its engineers had the goal of obtaining the entire air conditioning and ventilation technology from a single source.

The excellent cooperation during the new construction of the surgical clinic of the University Hospital Heidelberg played a key role in the decision to choose TROX once again. It was primarily the positive experience with TROX HGI GmbH during the joint design and commissioning of the control technology, including its connection to the central building management system, that ultimately contributed to TROX being awarded the contract.

## **Ventilation and air conditioning: stringent conditions for hygiene and safety.**

Ventilation and air conditioning systems in hospitals must ensure that the contamination of air with micro-organisms is reduced to a minimum and that strict limits are not exceeded. They must ensure that dust, anaesthetic gases and odorous substances are contained, while simultaneously maintaining a comfortable environment with a climate of well-being. This applies in particular to operating theatres, intensive care units, delivery rooms and baby wards, but also to nursing and treatment rooms and lounges.

## **Air supply technology for maximum hygiene.**

House M, spread across an overall area of 21,000 m<sup>2</sup>, is supplied with outside air by 12 TROX X-CUBE air handling units in the ventilation plant room on level 02. The flow rate is 320,000 m<sup>3</sup>/h.

The air treatment of the ventilation and air conditioning systems consists of a separate air preheating for filters, heat recovery, cooling coil, heating coil and steam humidifier. The differential pressure of the air filters and the fans is reported to the automation system in an analogue manner. In the building, fire dampers, volume flow controllers and shut-off dampers must be connected and controlled.

Thanks to the installation of the TROX RAC system, a regenerative heat recovery system, airflows

are completely separate from each other. This is an important hygienic aspect, as leakage between supply and extract air is neither desired nor permitted.

The TROX hydraulic unit including special RAC control guarantees highly efficient heat recovery. Heat recovery efficiencies of up to 80% can be achieved with this system.

As a special feature, additional humidification in the ventilation and air conditioning systems ensures improved well-being for patients and staff, which has a positive effect, especially in the cold months of year. The supply of fresh air to the 26 operating theatres is optimised in terms of energy efficiency via integral volume flow controllers by mixing in processed recirculated air.

The 380 TROX VAV controllers in various designs and more than 2150 CAV controllers ensure correct airflows in the individual supply areas.

#### **Jet fans for the central emergency department.**

The central emergency department is connected via the ventilation systems on level 2. Due to the location of the ventilation systems in the western part of the building, the duct routes to the central emergency department span approx. 250 m. For this reason, jet fans are used at the shaft entrance to the central emergency department in the supply and exhaust air line. Two jet fans each with corresponding multileaf dampers in the supply and exhaust air lines ensure the supply of fresh air.

#### **Connection to the building automation.**

The building automation system (BACnet automation technology with a total of 33 information focal points (IFP) and 25 further input and output modules for connecting the field devices) controls the ventilation, cooling and heating in accordance with DIN 18382 and DIN 1838 (building automation).

The different states are displayed in the on-site BACnet control centre.

The opening and closing of the fire dampers is shown with monitoring of run time. All fire dampers must be individually switchable from the Direct Digital Control (DDC) as well as from the central BMS. Communication between the automation station and the fire dampers takes place via the ASI network. Connecting and linking external components such as refrigeration systems, consumption meters, pumps, volume flow controllers, etc. to the control automation system is performed via various bus connections.

A total of over 117,000 m of control cable and over 1,600 m of cable trays have been installed. A total of over 15,000 data points are also controlled.

#### **Ventilation technology for operating theatres.**

The most critical requirements apply to the air in operating theatres. To prevent the risk of infections caused by airborne pathogens, and to ensure that standards of occupational medicine are adhered to, airflow strategy and air filtration, and in particular intelligent control, play an extremely important role.

The main ventilation plant room on level 02, with four supply air and four and extract air systems, provides a low-turbulence laminar flow (LF) via LF ceilings, which dynamically screens off the most sensitive area with the operating and instrument tables (1a requirement).

The air is extracted with stainless steel extract units with lint screens at each of the four corners. The supply air for a further eight operating theatres in class 1B is supplied via four ceiling mounted particulate filters (filter class H14).

#### **Pressure conditions prevent infiltration into adjoining rooms.**

Operating theatres must only be accessed via airlocks. The ventilation system ensures positive pressure that prevents pathogens from entering from adjacent rooms.

In the three intensive care units as well as in the sterile care and isolation rooms, positive/negative pressure differences, airlocks and effective supply and extract air filtration also ensure isolation from the 'outside world'.

#### **Fire protection and smoke extract system.**

Over 1,200 motorised fire dampers in the building ensure that individual areas are safely closed off in the event of an emergency thanks to intelligent control.



TROX is a global leader in the development, manufacture and sale of components, units and systems for the ventilation and air conditioning of internal spaces. With 34 subsidiary companies in 29 countries on 5 continents, 20 production facilities, and importers and representatives, TROX is present in more than 70 countries. The TROX GROUP currently has around 4,600 employees and generates revenues of roughly 600 million euros.

For further information or should you have any questions about TROX, please contact:

TROX Press Office  
voice: +49 2845 202 - 561  
press-de@troxgroup.com  
www.trox.de