



The innovative air handling unit. By TROX.



**TROX**® **TECHNIK**  
The art of handling air

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### ► The art of handling air ►►

TROX understands the art of competently handling air like no other company. Since its foundation in 1951, TROX has been developing sophisticated components and efficient systems for ventilation and air conditioning as well as for fire and smoke protection. Dedicated research has made TROX a leader of innovation in these fields.

**TROX is developing from a mere component manufacturer and system supplier to a 'one-stop shop'.** The innovative X-CUBE by TROX is a milestone in the market for air handling units and defines considerably higher levels of quality, performance, flexibility, reliability, energy efficiency, and hygiene. Compelling all down the line.

#### Demand-based solutions

Working closely with its customers, TROX develops bespoke and demand-based systems that take the relevant criteria for each building into account and meet the requirements of its occupants. This close cooperation leads to sustainable solutions that help to increase people's well-being and to protect life and the environment.

## TROX X-CUBE – The only true measure

### System quality from a single source

With the X-CUBE air handling units TROX continues to set new standards. TROX offers air handling units and all other components of an air conditioning system from a single source and ideally complementary to each other.

The extensive know-how and expertise of TROX in the fields of acoustics, fire and smoke protection, and filter technology, to name but a few, have been incorporated in the X-CUBE. Customers benefit through less coordination effort and the opening up of new and exciting opportunities in room air conditioning.

### Unlimited configuration options

With 2 m/s airflow velocity the units cover an air volume flow rate range of 1,200 m<sup>3</sup>/h to 100,000 m<sup>3</sup>/h (0.3 to 28 m<sup>3</sup>/s) and offer unlimited configuration options. They can be used for all air treatment processes. X-CUBE units are available as supply or extract air units, or as a combination of both, arranged side by side or on top of each other. While even the standard construction version is of extremely high quality, a special hygienic construction variant to DIN 1946/4 and a weatherproof variant for outdoor use complete the product range.

Each air handling unit is a customised product. All components ideally complement each other, and customers can expect the excellent quality for which TROX is so well known. TROX provides the best solution for virtually every application situation.



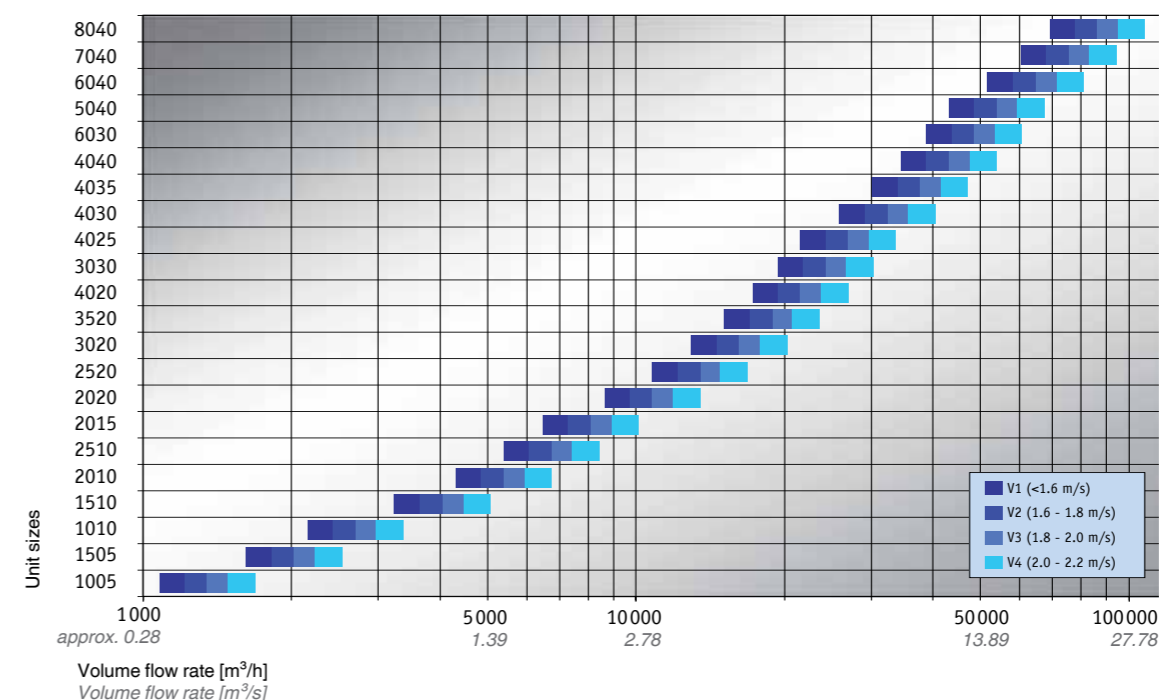
The TROX information centre in Neukirchen-Vluyn, Germany



X-CUBE measurements in Research and Development



Landing page: [www.trox-x-cube.com](http://www.trox-x-cube.com)



X-CUBE volume flow rates and unit sizes to EN 13053 (intermediate sizes not shown)



TROX air handling units are regularly examined (e.g. by TÜV SÜD, Germany)



Performance certified and approved by Eurovent (certificate no. 13.02.005)

## The future is now

### No compromises

In order to implement its innovative design and manufacturing concept with no compromises, TROX invested in 2011 a total of €20 million into a new production facility in Anholt, Germany. The plant, with the most advanced manufacturing equipment, has an area of 15,000 m<sup>2</sup>. This is one reason why production and logistics can be ideally matched to the X-CUBE units.

150 new jobs have been created. In Anholt alone, TROX has developed 52,000 m<sup>2</sup> of production area since 1961. Of all 14 production facilities with a total production area of 184,000 m<sup>2</sup>, the Anholt site is the largest.

### Made in Germany

Thanks to its most advanced manufacturing in Germany, TROX can supply excellent quality and meet the most demanding delivery times. Almost needless to mention that TROX implements the relevant industry standards and has all its components and processes certified.

This focus on quality provides customers with many advantages. To begin with, even the X-CUBE standard construction version meets all requirements of the German AHU Guideline 01 and of the VDI 6022 Guideline, and the technical performance is certified by Eurovent.

### TROX finds the best solution

The X-CUBE units offer maximum flexibility and can easily be configured to each application situation. Dedicated configuration software, developed by TROX, facilitates system design such that customers need not make any compromises. They can, in fact, have everything.



A configuration and design tool facilitates project design

## Exciting advantages for today and tomorrow

The most advanced technology and outstanding innovations make the TROX X-CUBE an exciting system for today and tomorrow.

### High energy efficiency

Energy efficiency was the guiding concept in the development of the X-CUBE. Construction, insulation, low leakage, heat recovery, energy-efficient motors, and intelligent control systems have resulted in a level of energy efficiency which not only meets but already exceeds the future requirements of the EC directive on energy-related products.

### Unparalleled hygiene

With the special shape of the casing, its smooth surfaces, and the way in which the components are installed, the X-CUBE complies with the VDI 6022 guideline. Even the high-quality standard version meets the very critical hygiene requirements of the DIN 1946/4 standard. A special hygiene unit that complies with AHU Guideline 01 is available for the most demanding requirements.

### Easy installation and maintenance

The modular structure and the low level of wiring required – a result of the extensive use of field bus technology – help to save installation and maintenance costs since all work can be carried out quickly and easily. Work safety is another important aspect as, for example, there are no sharp edges anywhere.

### Intuitive operation

The X-CUBE can be operated comfortably and safely using the touch panel. Virtually all status information is available at a glance. Operating errors are eliminated.

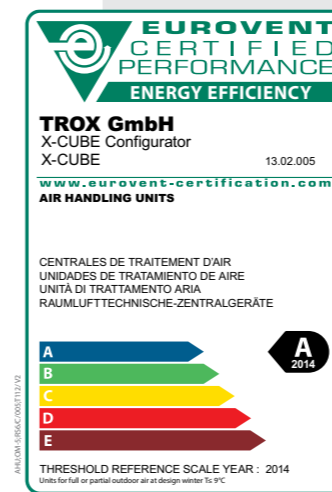
### Seamless integration with modern building management systems

The X-CUBE with its modular, expandable control system can be integrated into almost all modern building management systems using bus systems.

### Hydraulic unit for high-efficiency run around coil systems

The TROX hydraulic unit helps to implement highly efficient run around coil systems for diverse applications. The hydraulic unit includes its own control unit and can be integrated with X-CUBE CONTROL.

- Heat recovery, feeding of heating energy or of cooling energy or both
- Bus communication and conventional communication with the central BMS
- Minimal wiring effort during installation
- Intelligent control functions for maximum energy efficiency
- Optimisation of the glycol flow with regard to the air volume flow rate
- Performance control
- Icing protection
- Heat recovery with plausibility check



Highest energy efficiency class according to Eurovent



Quality in each detail



High-quality casing design

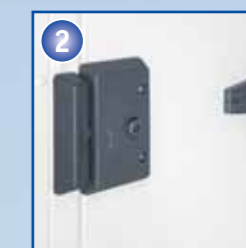


TROX hydraulic unit for HE run around coil systems

## Sophisticated details



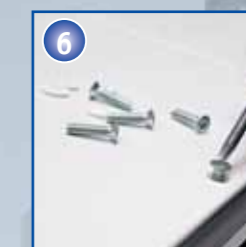
Large square inspection windows and energy-efficient LED illumination for easy inspection.



Safety cap prevents doors from being opened inadvertently or by unauthorised people. A special double latch on the positive pressure side allows for opening the door in a controlled manner.



Robust base with reinforced holes for the insertion of transport rods.



Panels have integral cover sections and can be removed and re-installed easily due to the metric threaded screws.

**Perfect for your requirements**

The X-CUBE can be perfectly adapted to individual project requirements

■ **Size**

Available in any size from 612 mm to 4,896 mm in width (1 to 8 filter elements) and 306 mm to 2,448 mm in height (½ to 4 filter elements).

■ **Construction**

Any arrangement of the components is possible. The X-CUBE is available as supply or extract air unit, or as a combination of the two with the units arranged side by side or on top of each other.

■ **Functions**

For all types of air treatment: air filtration, heat recovery, heating/cooling, humidification/dehumidification, and low-leakage shut-off.

■ **Applications**

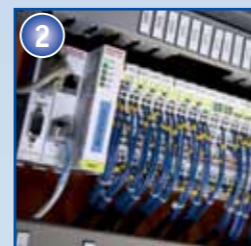
The units are available as high-quality standard versions, e.g. for office buildings. There is also a special hygienic construction variant (according to AHU Guideline 01) for hospitals and labs, a weatherproof variant for outdoor use, and a variant with type-certified integral refrigeration system.

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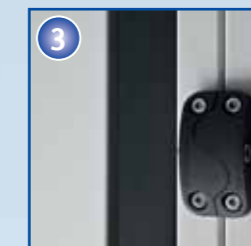
Unit sizes (10 ≙ 1 filter element)



Energy-efficient fan systems, such as directly driven impellers with EC motor, ensure maximum efficiency even under partial loads. Advanced permanent magnet motors comply with the future IE4 efficiency class according to IEC-60034-30 and complete the portfolio. The aerodynamically profiled steel or plastic fan blades achieve the highest efficiency with the lowest sound power level.



The modular, expandable measurement and control system on industrial PC basis enables communication with virtually all building management systems via BACnet, LON, Modbus, or OPC. Wiring is easy and requires only little effort. Additional TROX air conditioning components, such as volume flow controllers, smoke detectors, or adjustable diffusers, can also be integrated.



Internal 3D module connectors facilitate the accurate positioning of the modules for on-site assembly.



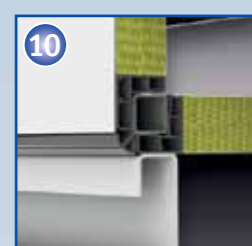
The robust TROX Mini Pleat filters have a compact depth, low initial differential pressure, and a high dust holding capacity. Like the TROX pocket filters made of glass fibre or NanoWave® media, which can be used as an alternative, they comply with energy efficiency class A and are certified by Eurovent. Filter classes M5 to F9 are available.



The powder-coated steel frame is completely covered by the panels, i.e. not visible from the outside; it provides a high level of flexibility.



The low-leakage TROX multileaf dampers with aerodynamically profiled hollow blades have been optimised for use in air handling units. Various standard or low-leakage configurations to EN 1751 are available (up to casing leakage class 4, e.g. for use in hospitals).



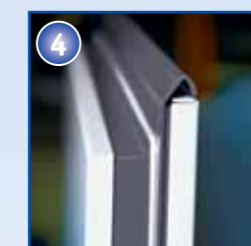
The acoustically and thermally insulated casing ensures elimination of thermal bridging even near the ground.



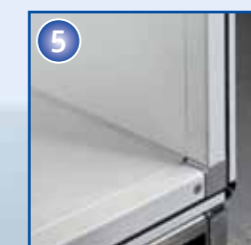
A wide spectrum of energy-efficient heat recovery systems, such as a regenerative rotary heat exchanger with hygroscopically coated thermal mass, allows for adaptation to each application situation. Plate heat exchangers or run around coil systems are also available. Run around coil systems can be combined with the dedicated TROX hydraulic unit (optional).



The TROX splitters with aerodynamically profiled frames achieve 30% less pressure drop than conventional splitters. The distance between the splitters can be individually adjusted with distance pieces that come in variable widths and double as handles to facilitate removing the splitters when the casing needs to be cleaned.



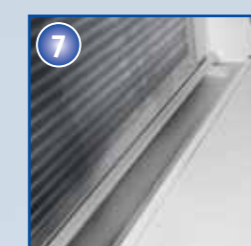
The innovative, thermally insulated panel construction with foam seal ensures very low leakage values and eliminates thermal bridging. Due to its only minimal heat loss the casing is classified as thermal transmittance class T2.



The interior surfaces are powder-coated or stainless steel, smooth and without any protruding parts. This makes cleaning both safe and easy.



Excellent corrosion protection on the inside and outside due to galvanised sheet steel that is pre-treated and then powder-coated RAL 9016 (other RAL colours available on request).



The heat exchanger for cooling and dehumidification is fitted with a stainless steel condensate drip tray sloped in all directions. The condensate drip tray is extra flat and used in the floor panel as well as in the intermediate floor panel. This ensures complete condensate drainage and that the entire unit is easy to clean.

**Numerous equipment variants**

The X-CUBE components come in different variants and allow for almost unlimited combinations to meet nearly every application requirement.

■ Various TROX filters, e.g. Mini Pleat filters or pocket filters using glass fibre media

■ Various energy-efficient heat recovery systems such as recuperative cross flow or cross counter flow plate heat exchangers, rotary heat exchangers or run around coil systems

■ Sound attenuator splitters that can be adapted to the acoustic requirements for each unit

■ Energy-efficient radial fans with EC, PM, or IE3 motor

■ Various TROX multileaf dampers in standard or low-leakage configuration according to EN 1751

■ Project-specific heat exchangers for heating or cooling

■ Various humidification systems such as steam humidifiers or adiabatic humidifiers

■ Various dehumidification systems such as rotary dehumidifiers

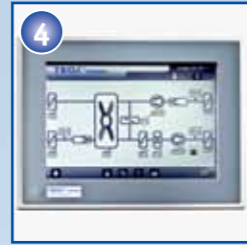
■ Modular, adaptable measurement and control system for different bus systems

■ A completely closed, powder-coated integral cable duct system

■ Integral vapour compression refrigeration system according to the European Pressure Equipment Directive 97/23/EC



Clear symbols on the panels guide technicians and simplify maintenance. External locks with handles facilitate access and cleaning.



The touch panel with the self-explanatory TROX software shows the entire system well-structured and enables intuitive navigation.



Adjustable external hinges with 180° opening angle facilitate cleaning and benefit hygiene. Since the hinge section on the doors consists of two parts, the doors can be easily removed.

Casing properties to EN 1886 certified by TÜV Süd, Germany

- Leakage class L1 (M)
- Mechanical strength class D1 (M)
- Filter classes up to F9 (M)
- Thermal transmittance class T2
- Thermal bridging class TB2



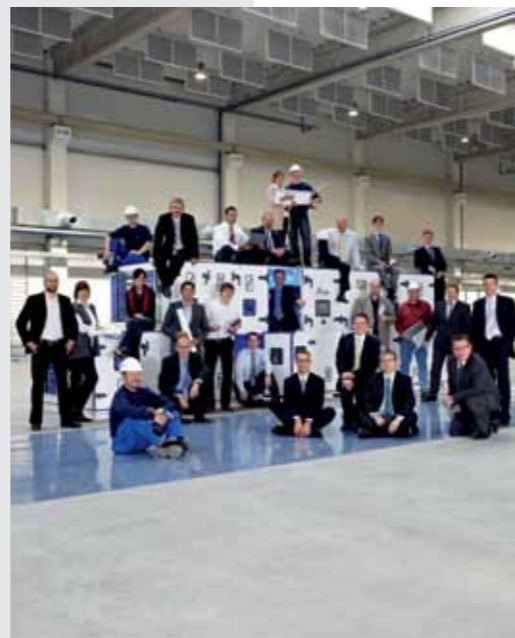
Model box thermal imaging



Computer-aided data analysis



Delivery and installation of a weatherproof X-CUBE



The X-CUBE expert team

## It's TROX

The unparalleled flexibility and impressive performance characteristics of the innovative unit design speak for themselves and are actually sufficient reason to have an X-CUBE. There is, however, another strong argument: TROX.

TROX offers customers more than just perfect air handling units.

### The whole picture

The TROX air handling units benefit from the company's decades of experience and attention to detail. All components ideally complement each other. TROX engineers look beyond the actual air handling unit; they take into account the whole ventilation and air conditioning system.

Its own test laboratories allow TROX to optimise the acoustic, energy-related or aerodynamic characteristics of a unit and of all its components. TROX is the only German manufacturer of air handling units whose know-how extends to filters, fire and smoke protection, sound attenuators, and to all other components and systems.

### TROX service from design to commissioning

TROX is a solution provider. Service starts with the design of air handling units, encompasses commissioning, and goes on to the training of engineers and maintenance staff. It is service which TROX customers have come to expect.

### Large, competent sales team

With its 70 members, the sales team for components and systems is the largest in the ventilation and air conditioning sector in Germany and is available to TROX customers for all questions in this field. An additional 15 expert sales engineers provide high-profile consultancy services.

### Customised delivery

X-CUBE units can be delivered as individual modules for installation on site, or they can be supplied pre-assembled if the maximum length does not exceed 12 m. As usual, TROX guarantees on-time delivery.

## The Anholt manufacturing plant

The Anholt production facility, where the X-CUBE units are produced, has the most advanced manufacturing equipment.

### This includes powder coating equipment

for fully-automatic coating with short colour changing times, pre-treatment of surfaces, and the most modern recovery system such that 210 m<sup>2</sup> of surface area can be coated per hour.

**The sheet metal centre** consists of a material storage tower, punching equipment, metal cutting guillotine, and sheet forming machinery; it can produce 110 panel sheets per hour.

**The sheet metal machining cell** includes a high-frequency CO<sub>2</sub> laser that cuts with high pressure to produce burr-free edges. Every 25 seconds a completely machined tube leaves the conveyor.

**The high-tech plastic section machining cell** has been designed for high speeds and maximum quality. Approximately 1,000 km of sections are produced here every year.

**The fully-automatic sealing foam application system** identifies the size and height of each panel and applies 2K sealing foam to panels every 60 seconds.



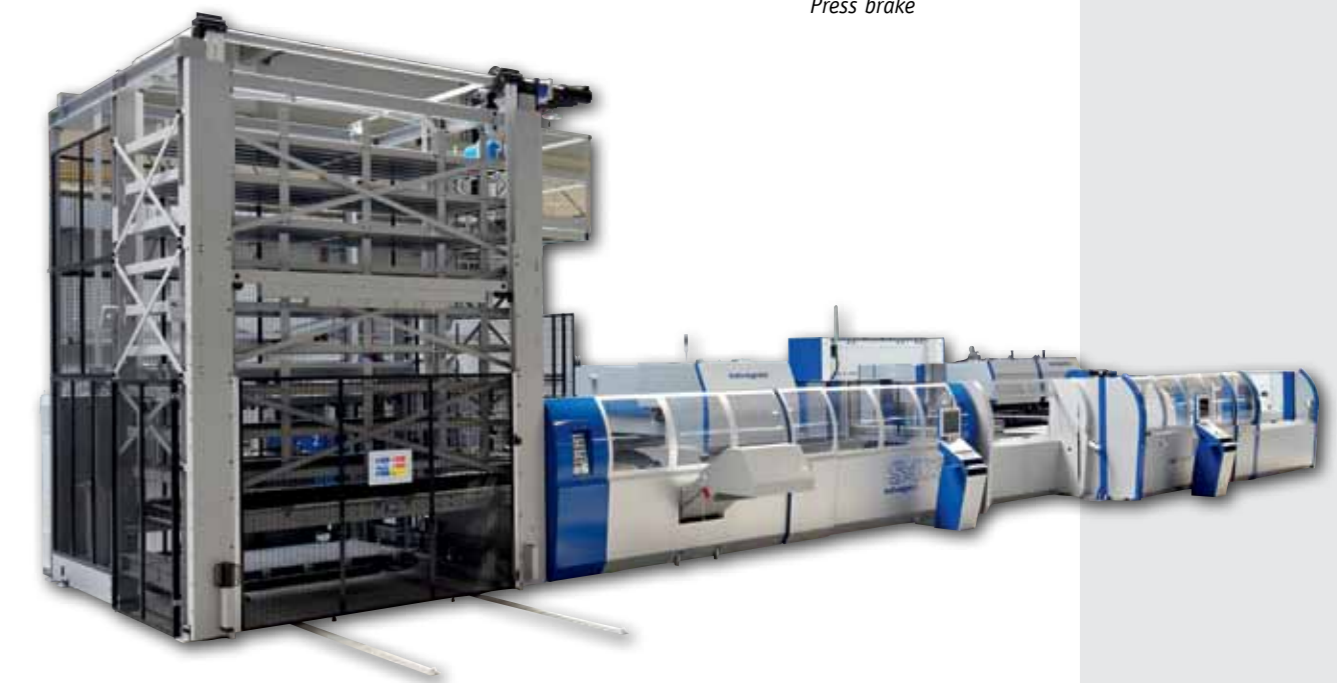
Optimised plant acoustics thanks to TROX splitters



Sheet metal machining with the latest laser equipment



Press brake



The state-of-the-art sheet metal centre for panel production



Pancras Square, King's Cross, London (UK)



Arla Foods Deutschland GmbH, Pronsfeld (Germany)



Mall of Berlin, Berlin (Germany)



Sky-Frame, Frauenfeld (Switzerland)



Marienhospital, Osnabrück (Germany)



Deva hospital, Deva (Romania)

## References

**Pancras Square in London (UK)** is the focal point for a group of multifunctional buildings with recreation centre, swimming pool, library and offices. As many as 21 X-CUBE units with a total volume flow rate of 540,000 m<sup>3</sup>/h have been installed.

### Arla Foods Deutschland GmbH, Pronsfeld (Germany)

After the merger of two dairies, there was no way around expanding the creamery for Arla Foods. 500,000 packets of butter are produced every day at Arla Foods, and seven X-CUBE units with volume flow rates of 1,200 to 48,000 m<sup>3</sup>/h provide the required air treatment.

### Mall of Berlin, Berlin (Germany)

With an area of 270,000 m<sup>2</sup>, restaurants and 270 shops, the Mall of Berlin at the Leipziger Platz is one of the biggest shopping centres in the German capital. The Mall, which opened in 2014, includes also 4,000 m<sup>2</sup> of office space, a 12,000 m<sup>2</sup> hotel, and flats with a total area of 30,000 m<sup>2</sup>. Air conditioning is handled by six X-CUBE units with a total volume flow rate of nearly 300,000 m<sup>3</sup>/h.

### Sky-Frame, Frauenfeld (Switzerland)

Innovative technology and striking designs are what Sky-Frame, based in Switzerland but leading internationally, are famous for. Their specially developed sliding window systems are installed all over the world. In the company's new head office, built in 2014, nine X-CUBE units provide a fresh breeze with volume flow rates of 600 to 7,600 m<sup>3</sup>/h, or 30,000 m<sup>3</sup>/h in total.

### Marienhospital, Osnabrück (Germany)

In the heart of Osnabrück, in northern Germany, you'll find the 150-year-old Marienhospital. The hospital operates at the highest medical level and treats 26,000 inpatients and more than 66,000 outpatients per year. When the radiology department had to be expanded, the hospital management turned to TROX. Two three-tier X-CUBE units, that could be installed in spite of considerable space restrictions, provide an ideal quantity of fresh air. The air handling units to DIN 1946-4 (increased hygiene requirements) provide unlimited configuration options and achieve volume flow rates of 5,000 m<sup>3</sup>/h each.

### Deva hospital, Deva (Romania)

Expanding the hospital is a two-step process. In the first step, the hospital received an additional 165 beds and 5 new operating theatres. Seven weatherproof X-CUBE units handle the air treatment. Volume flow rates reach from 4,600 to 19,500 m<sup>3</sup>/h. In the next step, a new medical centre with another 250 beds will be built. The new centre will be equipped with another four X-CUBE units for a total volume flow rate of 60,000 m<sup>3</sup>/h.

# TROX GROUP

## International Head Office

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### Bulgaria

TROX Austria GmbH

### China

TROX Air Conditioning Components (Suzhou) Co., Ltd

### Denmark

TROX Danmark A/S

### Germany

TROX TLT GmbH

### France

TROX France Sarl

### Great Britain

TROX UK Ltd.

### Hong Kong

TROX Hong Kong Ltd

### India

TROX INDIA PRIVATE LIMITED

### Italy

TROX Italia S.p.A.

### Qatar

TROX Arabia LLC

### Croatia

TROX Austria GmbH

### Malaysia

TROX Malaysia Sdn. Bhd.

### Mexico

TROX Mexico S.A. de C.V.

### Netherlands

TROX Nederland B.V.

### Norway

TROX Auranor Norge AS

### Austria

TROX Austria GmbH

### Poland

TROX Austria GmbH

### Romania

TROX Austria GmbH

### Russia

000 TROX RUS

### Switzerland

TROX HESCO Schweiz AG

### Serbia

TROX Austria GmbH

### Spain

TROX España, S.A.

### South Africa

TROX South Africa (Pty) Ltd.

### Czech Republic

TROX Austria GmbH

### Turkey

TROX TURKEY TEKNİK KLIMA SAN. VE TIC. LTD. STI

### Hungary

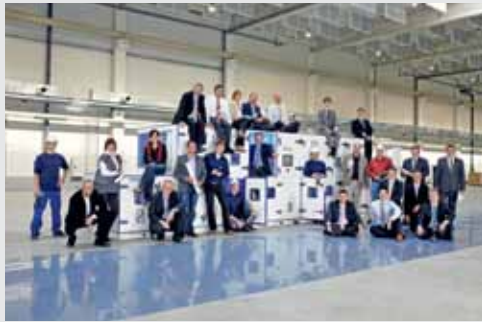
TROX Austria GmbH

### USA

TROX USA, Inc.

### United Arab Emirates

TROX Middle East (LLC)



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The art of handling air

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