



Decentralized ventilation units made by Krantz GmbH

Reference project



New building:
office + living + day nursery
Arabellastr. 30, 81925 Munich / D

- Building owner:
Bayerische Ärzteversorgung,
represented by the Bavarian
Pension Chamber
 - Architects:
h4a Gessert + Randecker
Generalplaner GmbH, Munich / D
 - Consulting engineers:
Kuehn Bauer Partner, Beratende
Ingenieure GmbH, Munich / D
 - Mechanical contractor:
Krantz GmbH, Deggendorf / D
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- Years of construction: 2012 – 2014
 - Office space:
26 000 m² gross floor area



Krantz is a leading manufacturer of customized air distribution systems and cooling & heating systems for commercial and industrial applications. High-quality cleanroom systems complement our range of products.

The office block "arabeska" was certified 'gold' by the German Sustainable Building Council (DGNB – Deutsche Gesellschaft für nachhaltiges Bauen). The design of the architects 'h4a Gessert + Randecker' borrows from the ornamental art of Arabian architecture.

In this project **775 ventilation units and 55 fan coil units** provided by Krantz were used for horizontal mounting in the raised floor.



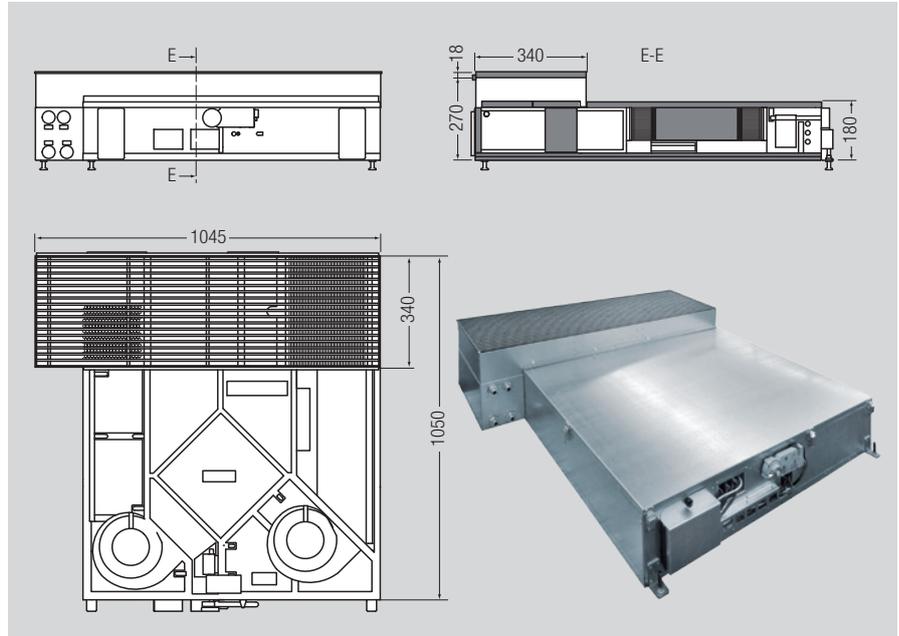
Picture: ©form3d

Our asset for your thermal comfort with ventilation units type LG-ZA

- Energy and cost-efficient technology
- Best possible comfort and indoor air quality at the workplace
- High user satisfaction
- Low space requirement



Ventilation unit for mixing ventilation
LG-ZA-MQ-LB, for horizontal floor mounting



Design set up and dimensions of the unit

Key demand

The project "arabeska" offers 26 000 m² of office space on 6 floors. In addition, 28 one-room, two-room or three-room flats as well as a day nursery will be erected in a separate building.

The central demand on the project is an efficient, eco-friendly method of construction that conserves natural resources. A great significance is given to the minimization of energy consumption and pollutant emissions.

With regard to technical building services, the following demands have been put into practice:

- Centralized ventilation technology and facade ventilation units with heat recovery
- Concrete core cooling for control of the room temperature and use of the storage capability of the building mass
- Reduction of energy consumption by demand-oriented control of the individual offices
- Flexible use of the offices, thanks to the entire technical installations in the raised floor

Main features

- Outdoor air intake and exhaust air discharge directly through the facade
- Acoustically optimized EC fans with low specific fan output SFP1 according to EN 13779
- Supply air flow according to the principle of mixing/displacement ventilation (VDI 3804)
- Room heating capacity up to 500 W
- Room cooling capacity up to 400 W
- Supply air volume flow rate: 25, 33.3 or 41.7 l/s [90, 120 or 150 m³/h]
- Sound power level L_{WA} : 36, 37 or 43 dB(A) ref. 10⁻¹² W
- Dimensions (WxDxH): 1 045 x 1 050 x 180 mm
- Heat recovery
- Bypass function
- Sound insulation and thermal insulation
- Admixture of secondary air

Key

Specification of the type of air according to EN 13779

SRO Single room outdoor air

SRS Single room supply air

SET Single room return air

SEH Single room exhaust air

SEC Secondary air

1 Outdoor air damper

2 Exhaust air damper

3 Controller for constant air volume flow rate

4 Outdoor air filter F7

5 Bypass damper

6 Recuperative heat recovery

7 Secondary air damper

8 Supply air EC radial-flow fan

9 Return air EC radial-flow fan

10 Air-to-water heat exchanger heating and cooling

11 Supply air temperature sensor

12 Return air filter F5

13 Floor air grille/Supply air outlet

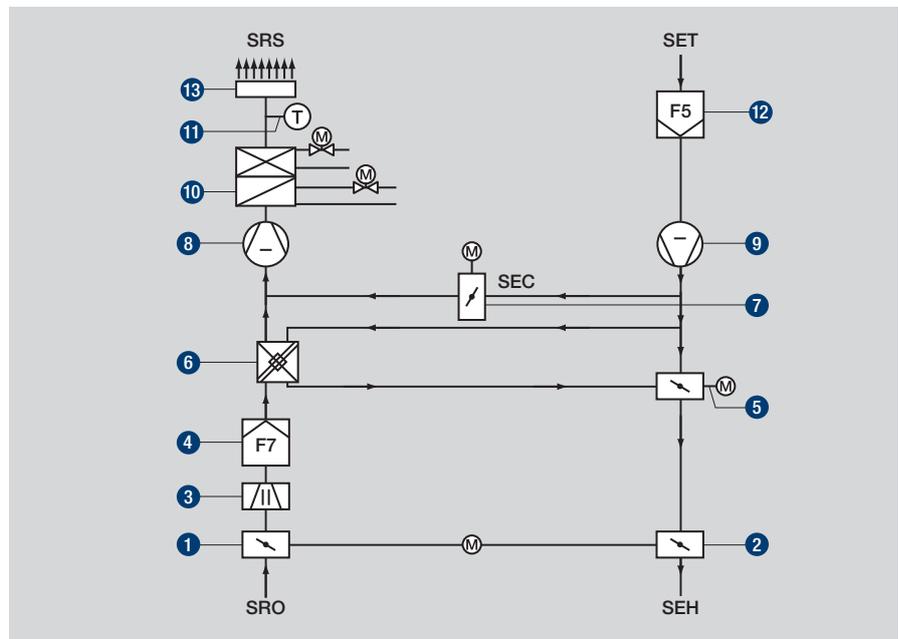


Illustration of modes of operation

Description of the function

The decentralized ventilation units are used for ventilation and air extraction in office spaces; cooling and heating loads are covered as well. The units are mounted close to the facade, the functional part covered by a grille is located below the raised floor. The outdoor air and exhaust air connections are made directly at the facade.

Besides the outdoor air supply and the exhaust air extraction the following modes of operation are possible:

- Cooling
- Heating
- Cooling with outdoor air (free cooling)
- Operation with heat recovery
- Operation with recirculated air

Description of the function

The supply air EC radial fan 8 takes in outdoor air via the outdoor air damper 1. The controller for a constant air volume flow rate 3 is limiting the pre-adjusted constant air volume flow rate in all three fan speeds to 25 l/s [90 m³/h] even at high wind pressure on the facade.

The collected air flows through the filter 4 and afterwards through the recuperative heat recovery 6. Inside the heat recovery, heat is removed from the return air and is transmitted to the outdoor air in cross flow. Depending on the requirements, the exhaust air can be conducted via a bypass damper 5 in such a way that operation with free cooling is possible.

If required, the supply air in the water heat exchanger 10 will be heated or cooled thereafter and flows through the floor grille into the office space according to the principle of mixing/displacement ventilation.

With fan speed 2 and 3 secondary air is admixed to the outdoor air in order to increase the thermal performance.

An equally large volume flow rate is collected from the room by the return air fan 9 via the filter 12 and discharged outside via the recuperative heat recovery 6 and the exhaust air damper 2.

Heating and cooling operation with recirculated air

This intermittent mode of operation serves to maintain the temperature when the room is not in use, e.g. at night and at the weekend.

The dampers 1, 2, and 5 are shut. The air fans 8 and 9 take in indoor air via filter 12 and convey it through the open recirculated air damper 7.

In the water heat exchanger 10 the supply air is heated or cooled at maximum capacity before it is discharged through the floor grille into the room.

If the set temperature in the room is achieved, the fans turn off and the heating or cooling damper is shut.



"arabeska", example of an office space

Bilder: ©form3d

Summary

The implementation of meeting the demands of optimized indoor air conditions while taking into account energy-efficient components requests a high degree of technical innovation in modern office environments. For this reason, our research and development centre developed the combined supply and return air ventilation unit type LG-ZA-MQ-LB, customized for the "arabeska" project.

Further to this, high acoustic requirements had to be fulfilled.

The requirements of the building owner
Speed 1: 8.3 l/s [30 m³/h],
36 dB(A) ref. 10⁻¹² W
Speed 2: 33.3 l/s [120 m³/h],
37 dB(A) ref. 10⁻¹² W
Speed 3: 41.7 l/s [150 m³/h],
43 dB(A) ref. 10⁻¹² W
were realized.

In order to meet the energetic requirements, EC fans each with a nominal volume flow rate of 33.3 l/s [120 m³/h] were used, which consume altogether only 25 W of electric capacity. Heat recovery also provides savings of energy by using the return air to preheat or precool the supply air. Operation with recirculated air for maintaining the temperature at the weekend and at night essentially contributes to the energy efficiency of these units as well. Because of the limited

space on site, a very compact unit with the dimensions 1 045 x 1 050 x 180 mm was designed. The air filters below the floor grilles can be replaced easily and without tools. An integrated controller provides a constant outdoor air volume flow rate of 25 l/s [90 m³/h], for all three fan speeds, even at high wind pressure on the facade .

The integrated air filters reduce pollution by particulate matter and pollen (filter classes outdoor air F7 and return air F5 according to VDI 6022-1).

In order to communicate a realistic evaluation of the capacity of the decentralized ventilation units and to prove the thermal comfort, a model of the real installation situation was prepared in our research and development centre and presented to the customer.

The installation of the units on site was carried out by fitters of Krantz GmbH.

For further information regarding ventilation units LG-ZA click [here!](#)

Matthias Kiebel, 5th May 2014

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