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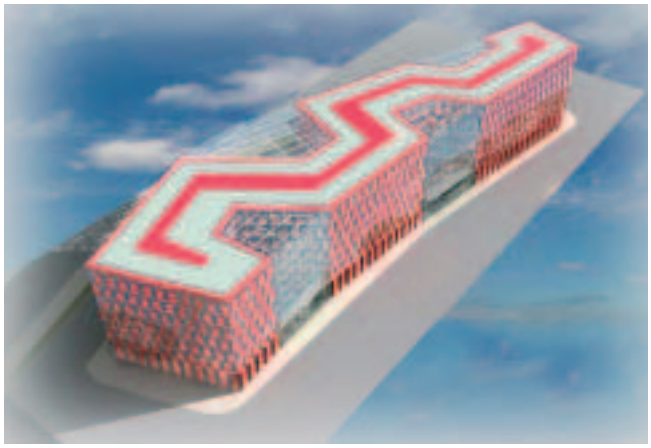
FassadenSystemLüftung
FSL
A Trox Group Company

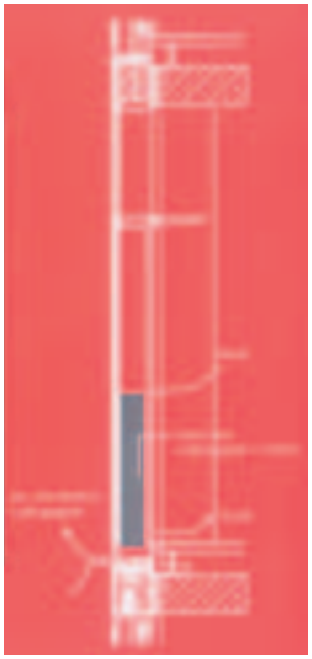
Project information CAPRICORN HOUSE
Decentralised sill ventilation units FSL-B-ZAU

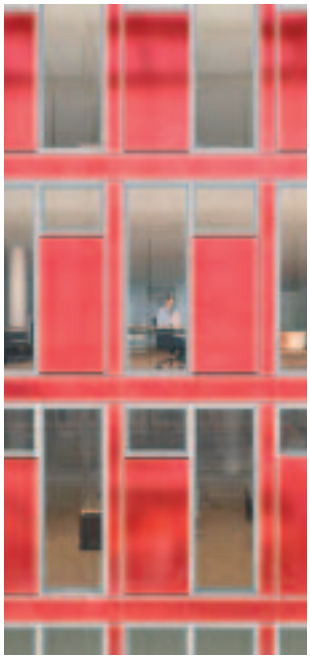
PI/FSL/11/EN/2

CAPRICORN HOUSE · Düsseldorf



CAPRICORN HOUSE, View from top





CAPRICORN HOUSE · Façade

The building

CAPRICORN HOUSE in the MediaHarbour, Düsseldorf, is an agreed example of where innovative architecture and the latest technology have convincingly succeeded. The owner CAPRICORN has designed and developed, together with the architects GATERMAN + SCHOSSIG, a modern building for the future harbour location.

The CAPRICORN HOUSE is a low energy building with extremely low operating costs. Numerous components were custom designed. The carefully designed layout concept is suitable for the use of all types of offices on all floors and ensures maximum flexibility as a result of the winding course of the building layout which merges harmoniously into the environment.

The problem for the development of ventilation units was the technical integration into minimal dimensions of only 200 mm unobstructed installation depth. Since a traditional building façade is not used, this results in a high degree of architectural freedom for the design of the internal area of the building.

The Integral Façade

In this project's active outer façade there are a number of newly developed components. The façade is made up from pre assembled elements with installed dimensions of 2.7 x 3.35 m. The perimeter grid modular size is 1.35 m.

The configuration of the façade incorporating transparent and closed sections provides a balance between outward visibility and the reduction of internal loads due to solar gain. The closed panels, based on architectural requirements, provide a multifunctional role. They provide a combination of heating, cooling and ventilation functions by use of a decentralised ventilation unit and light through the top section of the panel which also includes a light fitting.

The inner metallic surface of the panel is perforated to provide sound absorption.

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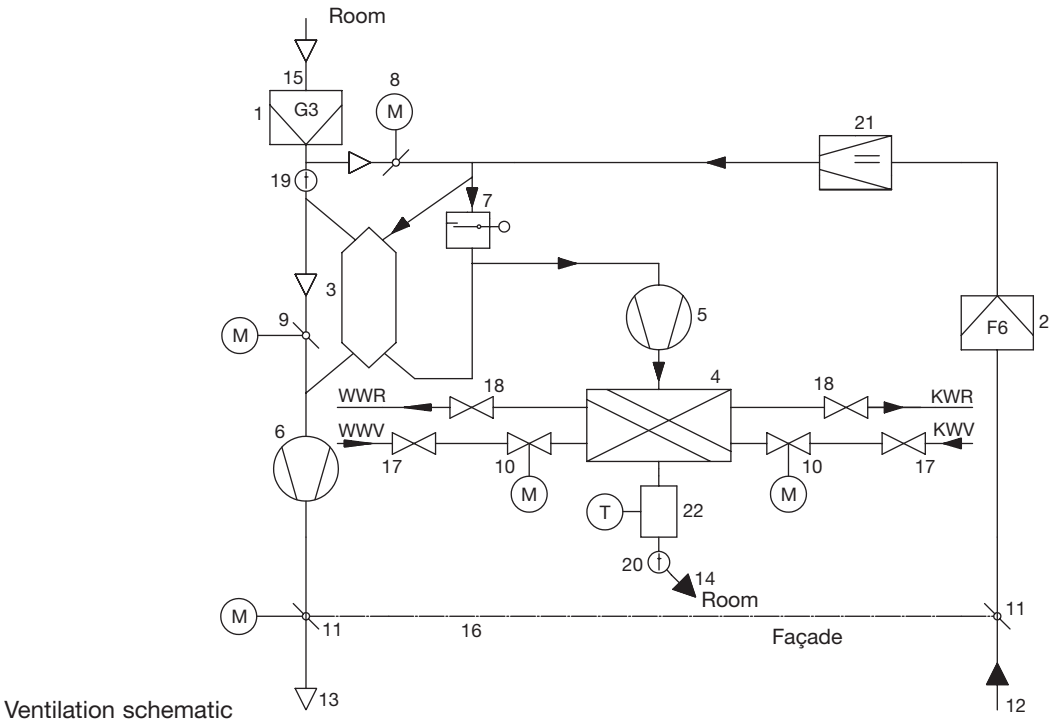
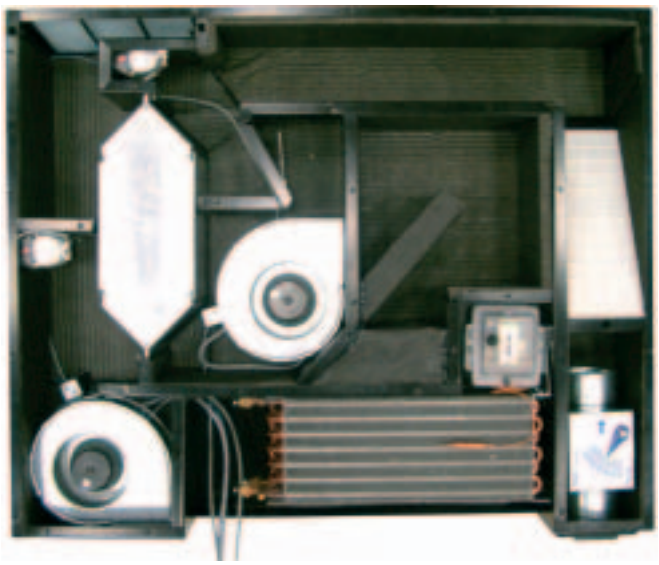
The decentralised ventilation units type FSL-B-ZAU



Ventilation schematic



Sill ventilation units

Legend

1 Extract air filter
2 Outdoor air filter
3 Air/Air-Heat recovery unit
4 Air/Water-Reheat coil
5 Supply air fan
6 Exhaust air fan
7 Back draught damper (automatic)
8 Recirculation bypass damper with spring return actuator
9 Recovery unit bypass damper with spring return actuator
10 Heating-/cooling valves
11 Façade dampers exhaust air/ outdoor air
12 Fresh/Intake air inlet
13 Exhaust air discharge
14 Supply air outlet
15 Extract air inlet
16 Coupled facade dampers
17 Shut-off ball valve
18 Balancing and shut-off valve
19 Extract air temperature sensor
20 Supply air temperature sensor
21 Flow rate controller
22 Frost protection thermostat

Layout

The decentralised ventilation units of the type FSL-B-ZAU model Capricorn consist of a lower part which is firmly integrated into the façade and includes outdoor air and exhaust air dampers, then there is a function box above this. The system layout of units is shown in the ventilation schematic above. The individual components are shown here in the same way that they are located in the unit.

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Description of function

The fresh/outdoor air enters directly through an opening in the façade. There is a spring return motorised shut-off damper (11) located at the bottom of the unit in the outdoor air inlet(12), this closes the inlet when the unit is inactive or in the case of a power failure. The exhaust air damper is coupled to the outside air damper by means of a connecting shaft (16) and the system is operated by a single actuator.

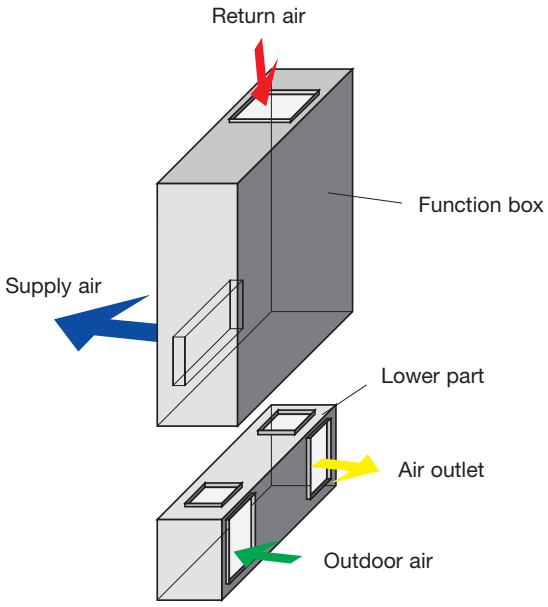
The fresh air is cleaned using an F6 fine dust filter (2) and then passes through an automatic mechanical flow rate controller (21) which limits the fresh air flow rate to a set maximum. Then the air passes through a recuperative heat recovery unit (3) in which part of the heat energy from the extract air is transferred to the inlet fresh air. A radial supply fan (5) then discharges the air through a 4 pipe coil with heating and cooling capacity. The air is finally discharged into the room through an under sill slot with a displacement flow characteristic. The extract air is taken from the upper sill area then passes through a G3 coarse dust filter (1). After this the air passes through the recuperative heat recovery unit (3). When in energy saving mode, in a transitional period, or for anti icing protection, a motorised bypass damper (9) is opened which bypasses the heat recovery system (3). The exhaust air fan (6) produces the necessary pressure differentials for the extract system. The motorised shut-off damper (11) with spring return actuator closes the exhaust air outlet when the system is shut down or in the case of a power failure.

The type FSL-B-ZAU model Capricorn can provide three flow rates 60/90/120 m³/h. All three settings can operate on full recirculation or full fresh air (as described above). For full fresh air, to achieve this the BMS opens the inlet and exhaust air dampers (11) and closes the recirculation damper (8). The BMS operates the supply air and exhaust air fans in parallel at the required level.

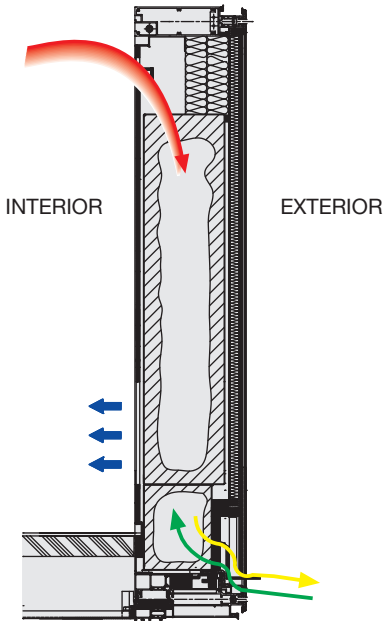
For full recirculation the fresh air inlet and exhaust air dampers (11) are closed and the recirculation damper (8) is opened.

In this case the exhaust air fan is switched off by means of a relay and the supply air fan is operated by the BMS to provide three flow rates with full recirculation.

The units can additionally operate in an asynchronous balanced mode. To achieve this, the fresh air inlet and exhaust air dampers (11), as well as the recirculation damper (8), must be opened. In this mode a second relay which is integrated into the unit switches the exhaust air fan on, providing a constant flow rate independent of the BMS requirements, this is at speed one providing 60 m³/h. If the fan is activated from central control and operates at speeds two or three, this only effects the supply air fan. The result is that the exhaust air is at a constant flow rate of 60 m³/h and the fresh/outside air supply is at 60 m³/h and depending on the actual fan setting there is a recirculation air flow of 30 m³/h or 60 m³/h for fan speeds two and three respectively. If the minimum fresh/outdoor air is being used with fan speeds two and three this mixing operation can save substantially more energy in the heating or cooling modes than when in the full fresh air mode due to the benefits of thermal recovery.



Modular unit structure



Façade section with integrated sill units

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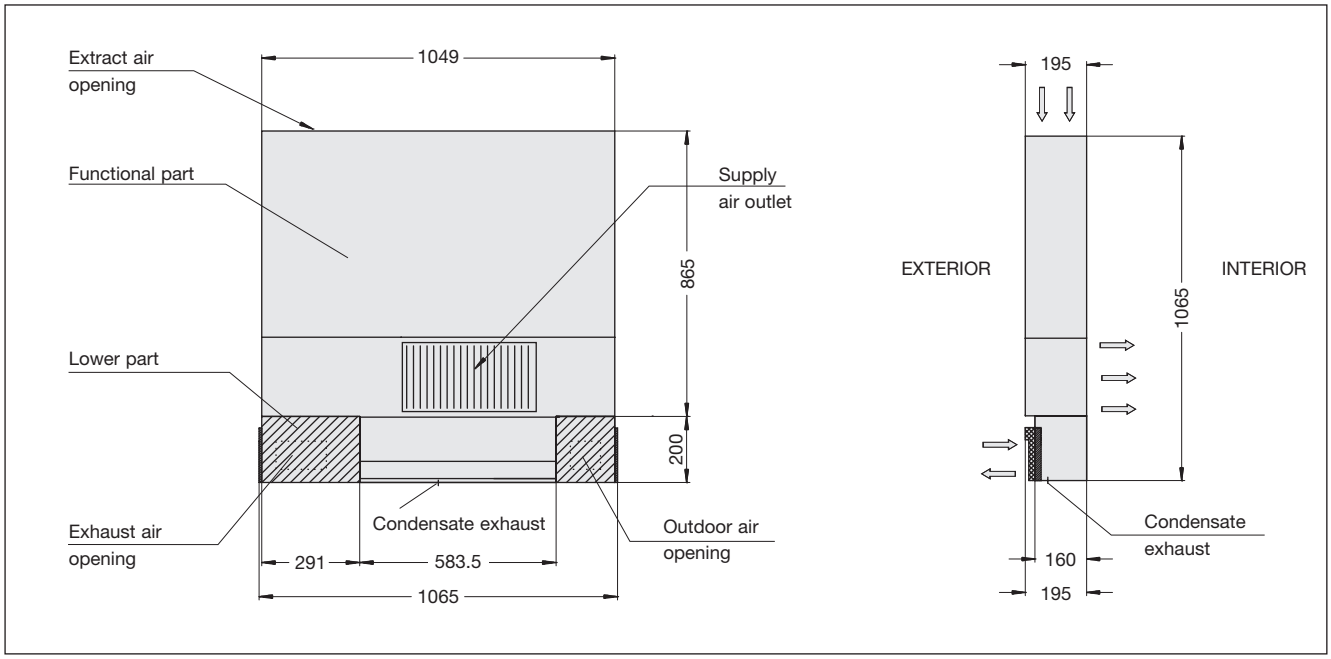
Dimensions



Technical data

The acoustic, flow-related and thermal optimisation of the units is based on project-specific specifications.
The stated values were confirmed by measurements in an independent laboratory.

Volumetric flows		**m³/h**	**60 – 120**
Cooling	Max. total cooling capacity	W	460
	Supply air temperature	°C	18
	Cold water flow temperature	°C	approx. 16
Heating	Max. total heating load	W	800
	Supply air temperature	°C	30
	Warm water flow temperature	°C	approx. 35
Sound pressure level (with 8 dB room attenuation)		dB(A)	23 – 38
Electrical power consumption		W	9 – 20