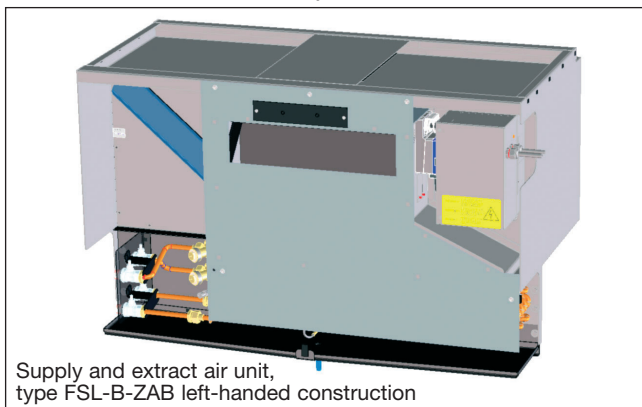




Laimer Würfel · Munich, Germany



Supply and extract air unit,  
type FSL-B-ZAB left-handed construction

Property developers: HOCHTIEF Projektentwicklung  
Architects: “frick krüger nusser plan 2”  
Utilities consultants: Planungsbüro – J. Weißenhorn  
CAE – H. König

### The building

The Laimer Würfel building on the city centre site in Landsberger Strasse in the Laim district of Munich, Germany is a contemporary office building characterised by the highly efficient use of surfaces and great individuality. Each of the 11 upper floors in the complex has approximately 1,900 m<sup>2</sup> of office space. The multi-functional ground floor includes retail areas, a conference area and a casino. Two impressive entrance areas lead into the Laimer Würfel building.

The striking element of the facade – copper – is contrasted and complemented by preweathered zinc elements. The multi-faceted appearance of the facade is finished off by high quality solar control glass on the ground floor and expanded metal solar shading in front of the office windows.

### The Ventilation and Air Conditioning concepts

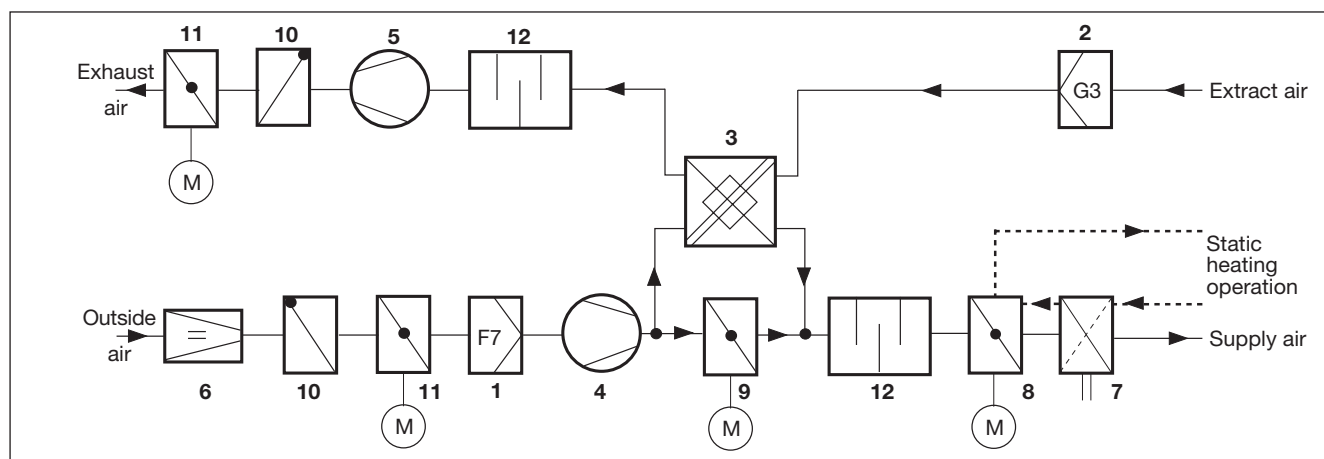
The upper storeys are individually and mechanically ventilated by type FSL-B-ZAB decentralised ventilation units built into the sill of the facade. The use of these modular units with interchangeable function boxes is the best way to accommodate the flexibility of office use. This design of unit provides heating and cooling of the office spaces, in addition to mechanical ventilation with heat recovery and air filtration.

Some facade modules do not have these decentralised ventilation units but are equipped with recirculated air heating and cooling units of the same dimensions (type FSL-B-UML). The system is further complemented by opening windows and additional cooling capacity by means of chilled ceilings may also be provided to deal with higher thermal loads. The ground floor, kitchens and store rooms are ventilated by a central plant air conditioning system.

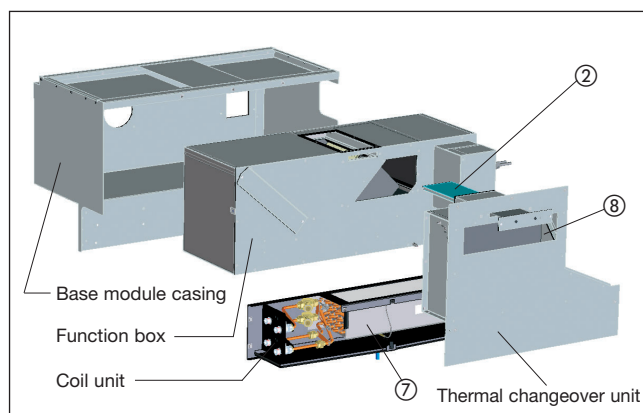
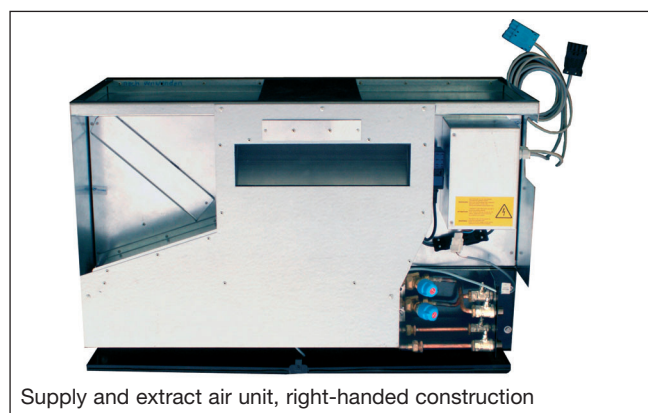


Facade with integral sill ventilation unit

### Ventilation schematic type FSL-B-ZAB



- |                                   |                                       |  |
|-----------------------------------|---------------------------------------|--|
| ① F7 – Outside air filter         | ⑤ Exhaust air fan                     | ⑨ Motorised heat recovery unit bypass damper |
| ② G3 – Extract air filter         | ⑥ Volume flow rate controller         | ⑩ Backdraught damper                         |
| ③ Recuperative heat recovery unit | ⑦ Coil unit                           | ⑪ Motorised shut-off damper                  |
| ④ Supply air fan                  | ⑧ Motorised thermal changeover damper | ⑫ Silencer                                   |



### The modular undersill ventilation unit – construction

The undersill ventilation unit in modular design comprises a base modular casing in galvanised steel sheet which is built into the facade section as early as the skeleton stage of construction. This will house the function box, coil unit and thermal changeover unit. The casing of the unit is installed close on the inside of the facade against the thermal partition through which the external air and exhaust air ducts pass. Weather protection is provided by weather-resistant louvres on the exterior of the facade.

At a further stage of the build, the casings are fitted with the coil units and the pipework is connected. During the later build phases, without hindering other trades, the casings can be equipped with the required function boxes – supply and exhaust air or recirculated air – and the thermal changeover units. As a last assembly and installation step, the electrical power supply connections are made along with the control system cabling which is provided by the client. The casings that are not equipped with function boxes must be fitted with a thermal and noise insulation box.

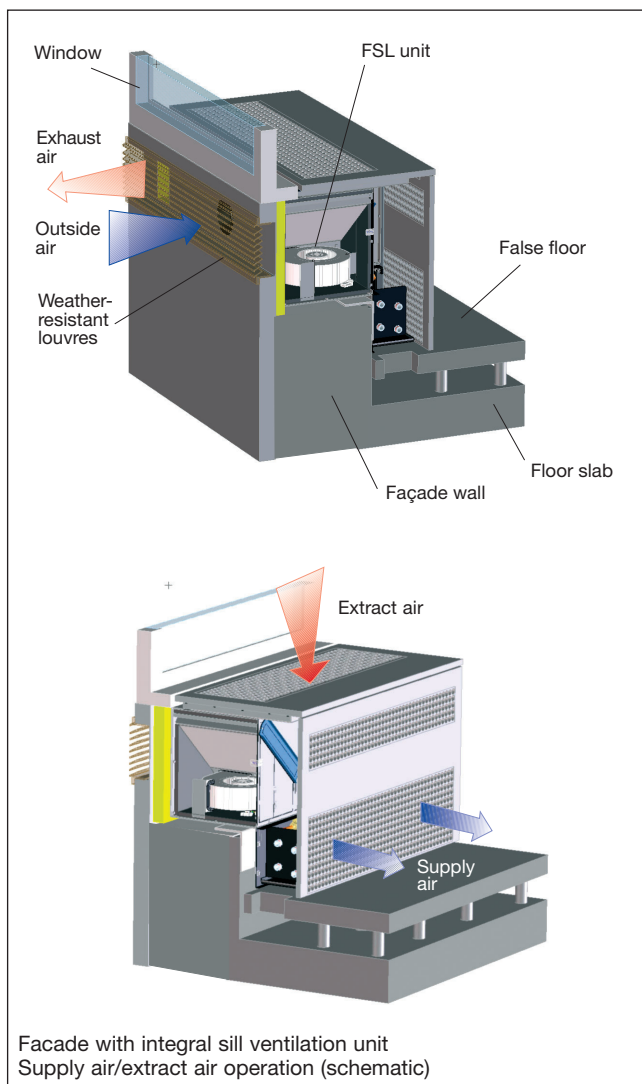
In the event of a change of use, function boxes can simply be retrofitted or changed. The function boxes comprise a galvanised steel sheet casing. The thermal and noise insulation is glass fibre fabric lined mineral wool and is non-flammable and resistant to erosion. The secondary air function box also contains a radial fan and a coarse dust filter. In addition to the motorised shut-off and backdraught dampers and the fans for outside and exhaust air, the supply and extract air box houses a volume flow rate controller and an F7 fine dust filter for the outside air, a G3 coarse dust filter for the extract air and a recuperative heat recovery unit with motorised bypass damper.

The coil unit consists of a copper/aluminium 4 pipe heat exchanger, the control valves and shut-off valves and a powder-coated, galvanised sheet steel condensate tray.

The galvanised sheet steel thermal changeover unit comprises the motorised damper for changing over between ventilation and static heating operation.

Project information – Laimer Würfel –  
Decentralised sill ventilation units FSL-B-ZAB

PI/FSL/12/EN/2



**Function of the supply air and extract air unit (FSL-B-ZAB)**

The outside air is taken in through the weather-resistant louvres. The mechanical automatic flow rate controller ④ at the unit entry limits the outside air volume flow to a set maximum. This also prevents excessive external air flow which could occur due to high wind pressure on the facade thus causing draughts in the conditioned space. The backdraught damper prevents conditioned air being sucked out of the room against the actual direction of air flow if there is a significant negative pressure on the facade. The motorised shut-off damper with its spring return actuator ⑪ closes the outside air inlet on the unit if the unit is inactive or in the event of power failure.

Once the outside air has been cleaned by means of the F7 fine dust filter ①, which complies with the hygiene requirements of VDI 6022, the radial flow fan ④ passes the air through the recuperative heat recovery unit ③. Here a part of the thermal energy in the exhaust air is transferred to the outside air.

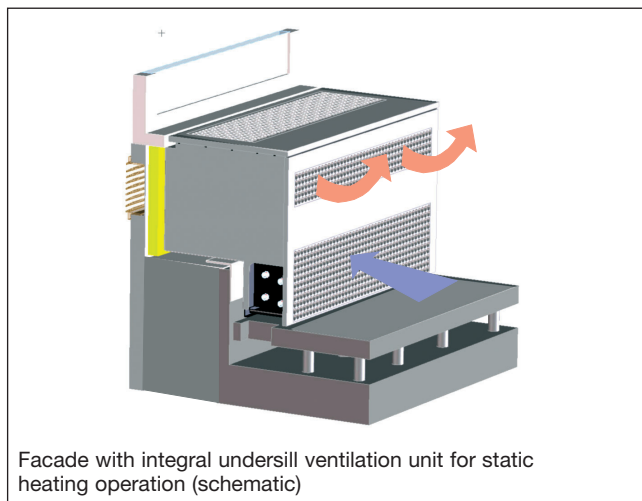
Where it makes sense from an energy standpoint during the transitional period and for frost protection, the motorised bypass damper ⑨ is opened and the bypass of the heat recovery unit results. The silencer on the unit ⑫ minimises the inherent noise and increases the standard sound level difference between the space and the outside. The material is not flammable (material class A) and complies with the hygiene requirements of VDI 6022. Once the air has passed through the thermal changeover unit ⑧ it is heated or cooled in the 4-pipe coil ⑦ and it then passes through the sill trim fitted by the client into the room as a displacement flow.

The motorised thermal changeover damper ⑧ shuts off the flow path when the ventilation unit is inactive and opens an outlet on the room side, so that the heating coil ⑦ fitted in the unit may be used as a convector heater for static heating (see diagram, below left).

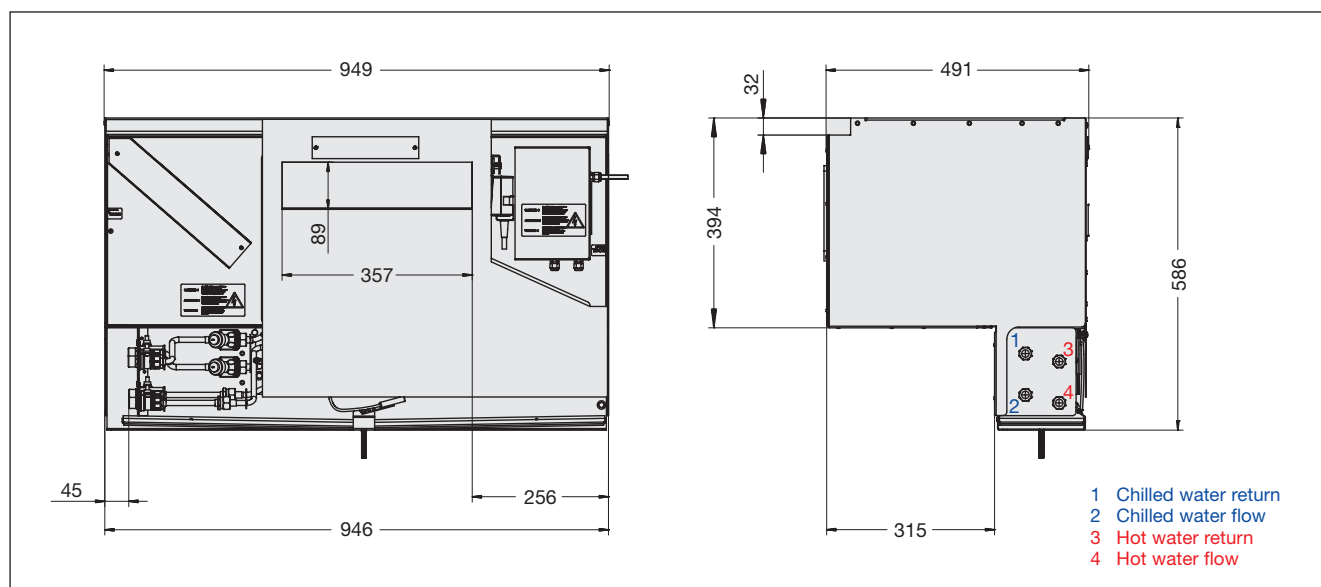
The exhaust air is taken out on the upper side of the unit through a trim provided by the client in the window sill area. It is then cleaned by a G3 coarse dust filter ② to minimise the contamination of the downstream components such as the heat recovery unit ③ in particular. The exhaust air fan ⑤ provides the pressure differential necessary to deliver the air. The backdraught damper ⑩ prevents outside air entering the exhaust air duct under conditions of high pressure against the facade. The motorised shut-off damper with its spring return actuator ⑪ closes the exhaust air opening on the unit if the unit is inactive or in the event of power failure.

**Function of the secondary air unit (FSL-B-UML)**

The room air is drawn in on the upper side of the unit through a trim provided by the client in the window sill area and cleaned by a G3 coarse dust filter to prevent contamination of the inside of the unit. The recirculated air fan generates the pressure differential necessary to deliver the air. Once the air has passed through the thermal changeover unit it is heated or cooled in the 4-pipe coil and then passes through the sill trim fitted by the client into the room as displacement flow. Static heating operation is possible, just as with the type FSL-B-ZAB units.



## Dimensions



## Technical Data

The acoustic, aerodynamic and thermal optimisation of the under sill units are based on the project specific requirements.

The coil selection was based on the required thermal performance and volume flows. The performance of the unit is summarised below.

		Supply and extract air unit			Secondary air unit	
Volume flow	m <sup>3</sup> /h	90	120	180	150	200
Sound power level	dB(A)	36	42	51	37	43
Sound pressure level with an 8 dB room attenuation	dB(A)	28	34	43	29	35
Standard sound level difference in operation	dB	52	52	52	56	56
Electric power consumption in operation	W	15	21	61	10	16
Fan control voltage	V	2.6	3.7	6.3	5	6.7
Total cooling capacity (including heat recovery unit)	W	500	600	Flushing stage for night cooling	410	480
Internal sensible cooling capacity	W	260	300		410	480
Outside air temperature	°C	32	32		–	–
Room temperature	°C	26	26		26	26
Supply air temperature	°C	17.2	18.4		17.9	18.9
Chilled water volume flow	l/h	84	84		84	84
Chilled water flow temperature	°C	12	12		12	12
Total unit heating capacity (bypass open)	W	1800	2300		1260	1430
Internal heating capacity	W	530	660		1260	1430
Outside air temperature	°C	-16	-16		–	–
Room temperature	°C	21	21		21	21
Supply air temperature	°C	38.5	37.5		46	42.3
Hot water volume flow	l/h	60	120	48	48	
Hot water flow temperature	°C	70	70	70	70	