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FassadenSystemLüftung

FSL

A Trox Group Company

## Project information ARCOR

Decentralised underfloor units, supply air type

PI/FSL/1/EN/1



### The building

The corporate headquarters of Vodafone Airtouch in Eschborn is one of the most modern office buildings in Europe. The building complex comprises three parts. The 26-floor high-rise section of the complex has an aluminium facade; the other two buildings are clad with natural stone façades.

A variable, space-saving room concept was achieved by means of the usage of bus technology and decentralised ventilation and air extraction.



### The ventilation concept

The building is ventilated using decentralised FSL underfloor units (supply air type). Using these units, the outdoor air is drawn in through the façade, conditioned and supplied directly to the room.

The return air is discharged to the outside using FSL return flow elements arranged above the window. Along with the acoustically and thermally insulated housing, these return flow elements comprise a backdraught damper. Using this automatic damper it is ensured that, in case of overpressure in the room, room air can flow outside through the return air elements, but in the case of underpressure in the room no air is forced into the building.

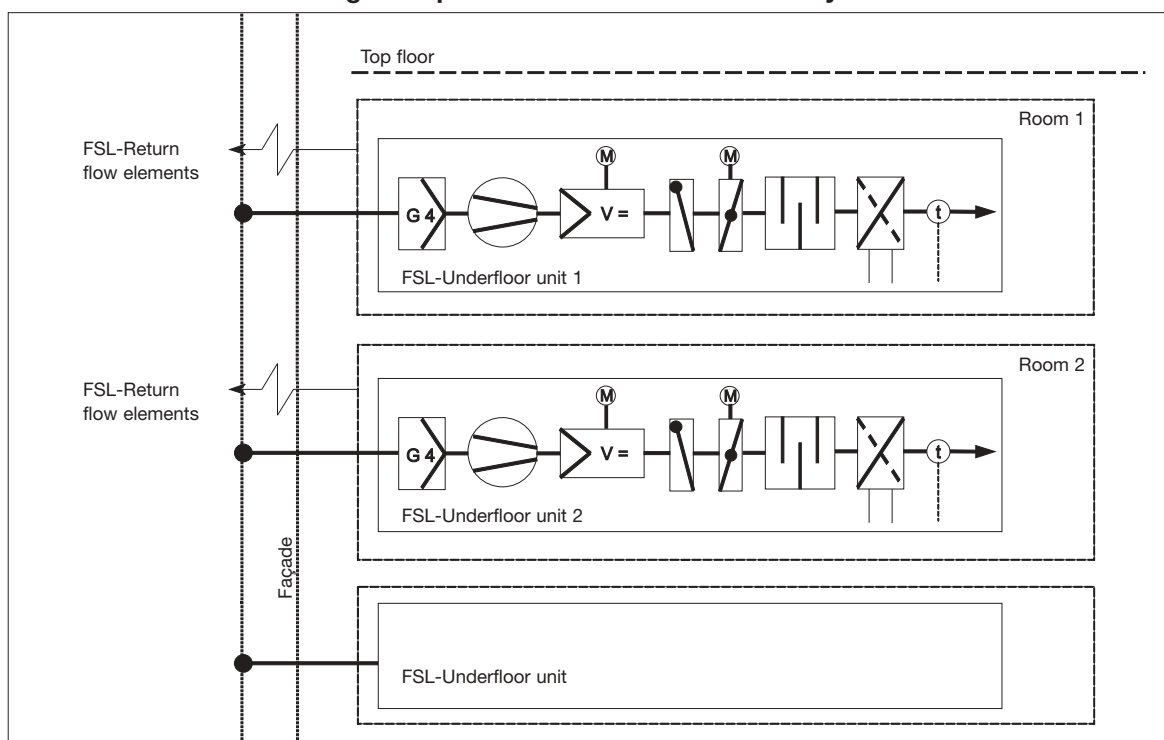
Along with the ventilation function, room temperature control is also implemented using the underfloor units. In this way the perimeter offices are individually ventilated, as the ventilation, heating, and cooling functions on underfloor units can be regulated separately for each office. The basic load for heating and cooling is provided by treatment of the concrete core.

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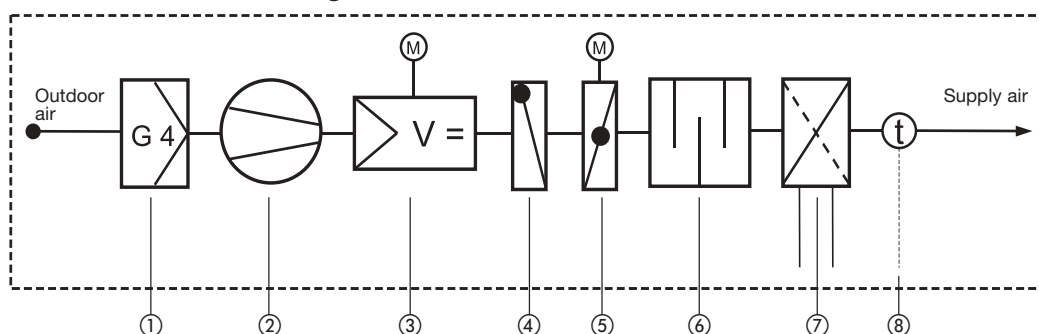
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### Underfloor units as an integrated part of the overall ventilation system



### Ventilation schematic diagram for the underfloor unit



- ① Coarse dust filter
- ② Fan
- ③ Flow rate controller
- ④ Backdraught damper
- ⑤ Motorised shut-off damper
- ⑥ Acoustic attenuator
- ⑦ Air heater or cooler
- ⑧ Temperature measurement

### The decentralised underfloor units

#### Layout and principle of operation

The FSL underfloor units are installed in the false floor. The housing is made of powder coated galvanised steel sheet. For acoustic cladding and thermal insulation, mineral wool faced with glass fibre fabric is used. Further key elements of the unit are the radial fan, filter, shut-off and non-return damper, volume flow controller, coils, as well as the electrical cabling. The electrical junction box with transformer is installed in the false floor above the unit.

The outdoor air is drawn into the unit through the intake spigot by a radial fan, and then through the air filter of class G4 installed in the inlet. It is possible to dismantle the fan simply and rapidly by undoing two screws; and to change the filter it is only necessary to remove the

filter frame and replace the filter pad once the cover on the unit has been removed.

The underfloor units are controlled by the building management system using various potential-free contacts. The flow volume controller of type RNS, equipped with an actuator, is set to the volume flow range (60/90/120 m<sup>3</sup>/h) as a function of required flow, and limits the supply air volume flow to this value in the case of external pressure variation on the façade. A non-return damper, fitted after the flow volume controller, prevents the air flowing back out of the room if the atmospheric pressure outside the façade is very low. The shut-off damper equipped with spring return actuator is closed when the ventilation unit is switched off such that

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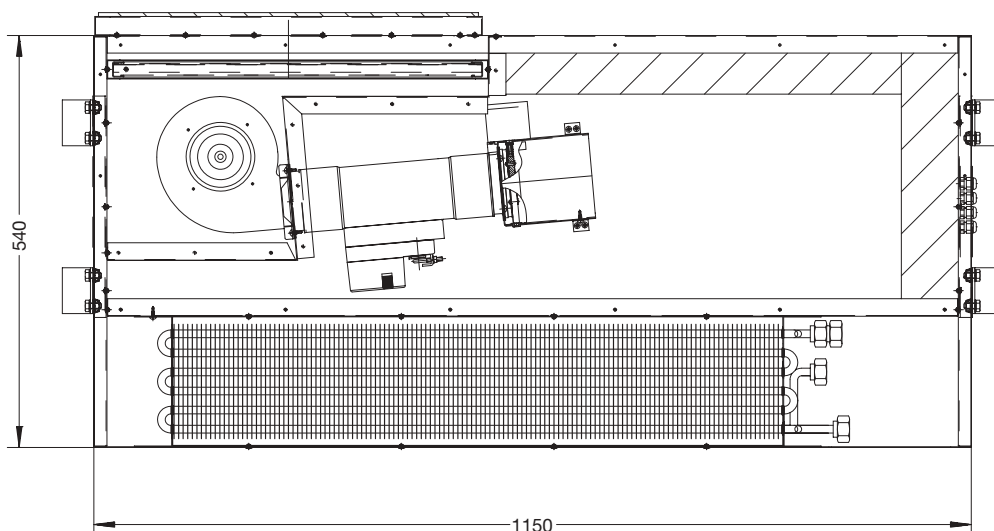
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there is no flow through the ventilation unit, independent of whether there is pressure or suction at the façade. The installation position of the flow volume controller was selected such that optimum air distribution through all of the coil areas is ensured; the coils are arranged downstream of the acoustic attenuator. The four-pipe coils can be used for heating and cooling. The supply air is introduced into the room via a grille in the false floor.

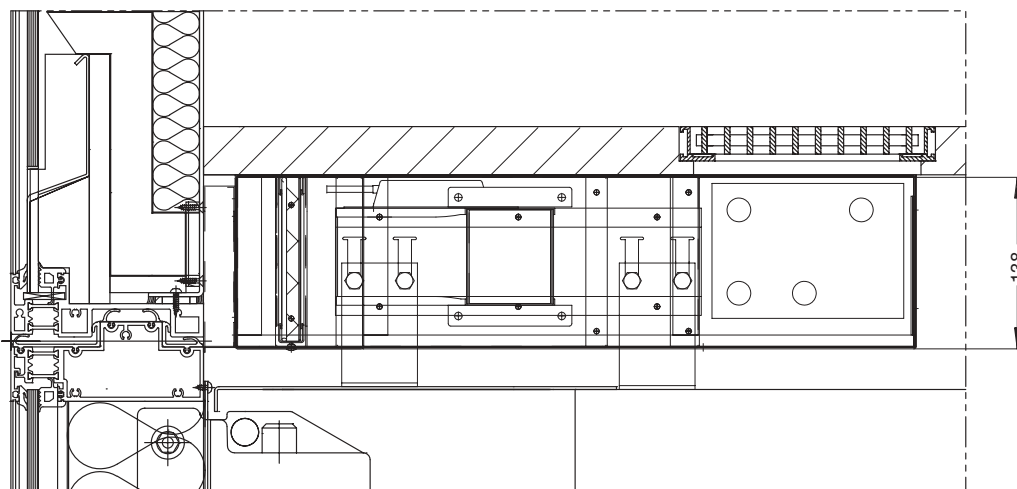
### Dimensions

The layout and dimensions of the unit were adapted to the specific building façade and the false floor. For this reason it was necessary to develop various types. In the following drawings, the standard unit (type 1) is shown. To compensate for the tolerances on the structure, it is possible to adjust the height by up to 30 mm using adjustable feet.

Underfloor unit – top view



Underfloor unit installed – section



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**Technical data**

The underfloor units were optimised to the specific thermal and acoustic requirements of the project. The coils were selected based on the performance figures required for the

volumetric flows stipulated. The performance data for the ARCOR standard unit type 1 is given in the following table.

Volumetric flow		m <sup>3</sup> /h	120	90	60
Cooling	Cooling load	W	520	350	230
	Air inlet temperature	°C	32	32	32
	Air outlet temperature	°C	19,1	20,4	20,5
	Chilled water volumetric flow	l/h	140	100	60
	Water flow temperature	°C	16	16	16
	Water return temperature	°C	19,2	19	19,3
	Pressure drop, water side	Pa	1480	1100	900
Heating	Heating load	W	1410	1250	850
	Air inlet temperature	°C	-12	-12	-12
	Air outlet temperature	°C	23,1	29,5	30,3
	Hot water volumetric flowrate	l/h	80	60	40
	Water flow temperature	°C	70	70	70
	Water return temperature	°C	54,8	52,1	51,7
	Pressure drop, water side	Pa	300	600	900
Sound pressure level incl. 8 dB room attenuation		dB(A)	38,1	29,1	24,5