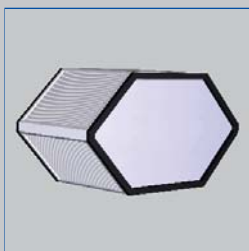
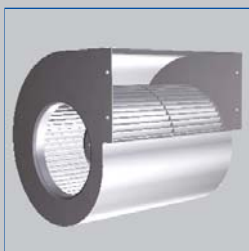


# Under sill units

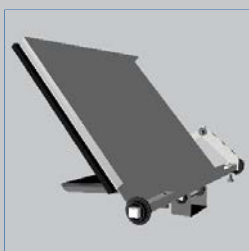
## Type FSL-B-ZAS



FSL-B-ZAS, heat recovery



Centrifugal fan



Adaptive heat recovery damper



Tested to VDI 6022



### Secondary air unit for supply air and extract air, with heat exchanger and heat recovery, for installation under the sill

Ready-to-operate decentralised ventilation unit that provides good comfort levels, used for the ventilation and extract ventilation of rooms

- Acoustically optimised EC fans with low specific fan powers, SFP = 1 according to EN 13779
- Counter flow heat exchanger for heat recovery (air/air), including variable bypass
- Heat exchanger for heating and cooling as 2-pipe or 4-pipe system
- Reduction of fine dust and pollen contamination due to integral filters that conform to VDI 6022 – F7 fresh air filter and G3 extract air filter
- Condensate drip tray with condensate drain
- Motorised shut-off dampers, normally closed (NC)
- Self-powered or motorised secondary air damper for adding secondary air to increase the thermal output

#### Optional equipment and accessories

- Modular control system X-AIRCONTROL, specially for decentralised ventilation systems
- Free cooling and night purge, depending on control strategy
- Various fixing systems to fix the unit to the floor or wall; a frame is also available
- Powder coating in many different colours, e.g. RAL CLASSIC

Type		Page
FSL-B-ZAS	General information	6.1 – 26
	Order code	6.1 – 30
	Quick sizing	6.1 – 31
	Dimensions	6.1 – 32
	Specification text	6.1 – 33
	Basic information and nomenclature	9.2 – 1

## Installation examples

### Installation example



### Installation example



## Description



FSL-B-ZAS

### Application

- Ventilation of rooms, preferably rooms with a depth up to 6 m
- 2-pipe or 4-pipe heat exchangers enable good comfort levels
- Inducing displacement flow
- Energy-efficient solution since water is used as a medium for heating and cooling
- For new buildings and refurbishment projects
- Installation under the sill
- Typical installation locations include offices and meeting rooms

### Construction

- Powder-coated RAL 9005, black, gloss level 70 %
- P1: Powder-coated in any other RAL colour, gloss level 70 %

### Nominal sizes

- 1245 x 800 x 400 mm (B x H x T)

### Useful additions

- Modular control system X-AIRCONTROL, specially for decentralised ventilation systems
- Connecting hoses

### Special features

- Motorised shut-off dampers for fresh air and exhaust air, normally closed (NC) in order to prevent uncontrolled airflows
- Recuperative heat recovery with motorised bypass (heat recovery > 80 %)
- Heat exchanger as 2-pipe or 4-pipe system, with G½" union nuts and flat seals
- Meets the hygiene requirements of VDI 6022

- Filter class: F7 for fresh air, G3 for extract air
- Condensate drip tray with condensate drain
- Compact construction, hence particularly suitable for refurbishment projects
- Demand-based ventilation is possible by means of monitoring the room air quality and with dedicated control equipment
- Installation into a frame

### Construction features

- 2 energy-efficient EC fans with low specific fan powers, SFP = 1 according to EN 13779
- Fresh air flow rate: up to 170 m³/h
- Counter flow heat exchanger for heat recovery, including motorised bypass damper
- The supply air is discharged to the room as an inducing displacement flow from the lower part of the unit
- Extract air is taken in to the upper part of the unit

### Materials and surfaces

- Casing, filter chamber cover, fans and levelling feet are made of galvanised sheet steel
- Heat exchanger with copper tubes and aluminium fins
- Plate heat exchanger made of aluminium
- Casing is powder-coated RAL 9005, black, or in any other RAL colour
- F7 filter medium made of moisture-resistant glass fibre paper (certified by Eurovent)
- Mineral wool lining to DIN 4102, fire rating class A, faced with glass fibre fabric as a protection against erosion, effective with airflow velocities up to 20 m/s
- Closed cell sealing strips

#### Installation and commissioning

- Mounting of the function box into a frame that is installed into the façade
- The fresh air connection is provided by two ventilation openings in the external wall (to be provided by others), preferably sloping towards the outside
- Weather protection for the inlets to be provided by others
- Installation and connections to be performed by others; fixing, connection and sealing material to be provided by others
- The water flow and return connections are on the left-hand side of the unit when seen from the room
- Vents and drainage by others
- The electrical connection is on the right-hand side of the unit when seen from the room

#### Standards and guidelines

- Façade ventilation units of Type FSL-B-ZAS conform to VDI 6035 and VDMA 24390
- Hygiene certificate to VDI 6022
- Heating/cooling medium conforms to VDI 2035

#### Maintenance

- VDI 6022, Part 1, applies (Hygiene requirements on air handling units and systems)
- The heat exchanger can be vacuumed with an industrial vacuum cleaner if necessary
- It can also be cleaned with commercial, non-aggressive cleaning agents

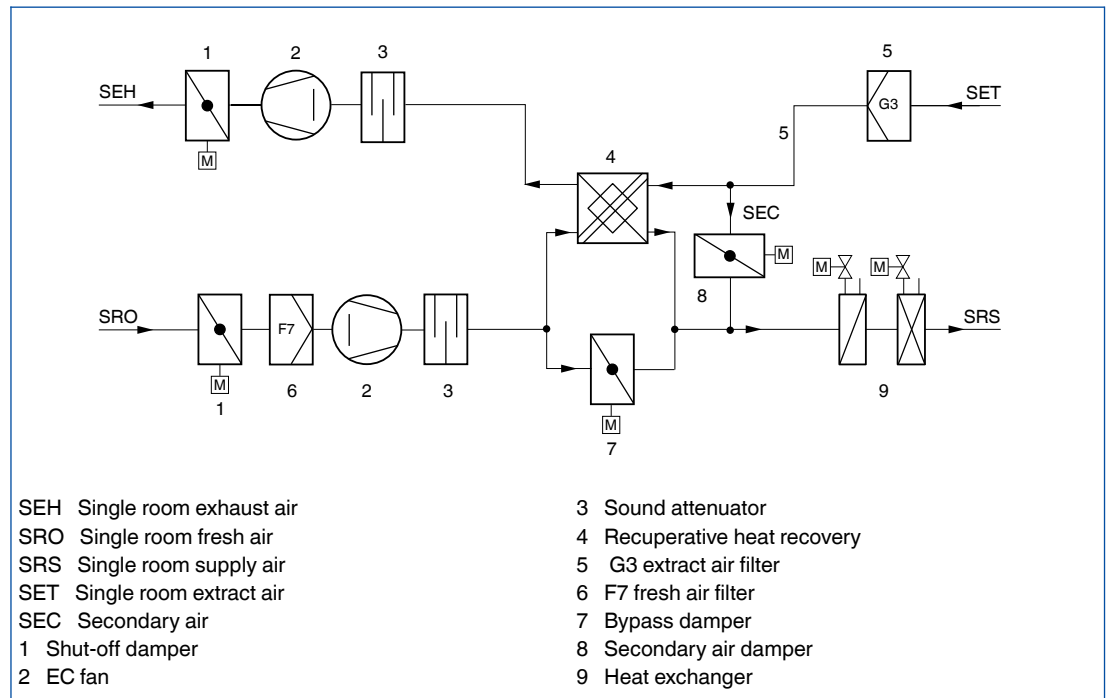
#### Technical data

Width	1245 mm
Height	800 mm
Depth	400 mm
Fresh air flow rate	Up to 170 m <sup>3</sup> /h
Supply air flow rate	Up to 170 m <sup>3</sup> /h
Cooling capacity	760 W
Heating capacity	2850 W
Max. operating pressure, water side	6 bar
Max. operating temperature	75 °C
Sound power level	38 – 46 dB(A)
Supply voltage	230 V AC ±10 %, 50/60 Hz

Schematic illustration of FSL-B-ZAS (E.ON ERC project)



Ventilation diagram for FSL-B-ZAS (Bennigsenplatz project)



Function

Functional description

Decentralised supply air and extract air units with secondary air function for room ventilation and extract ventilation and for dissipating cooling loads and heat loads.

An EC centrifugal fan takes in the fresh air which then flows through the motorised shut-off damper and the F7 filter.

Once the fresh air has passed the fan, it flows through the recuperative heat exchanger for heat recovery; it is possible to bypass the recuperative heat exchanger in order to protect it, or when it is sensible with regard to energy efficiency.

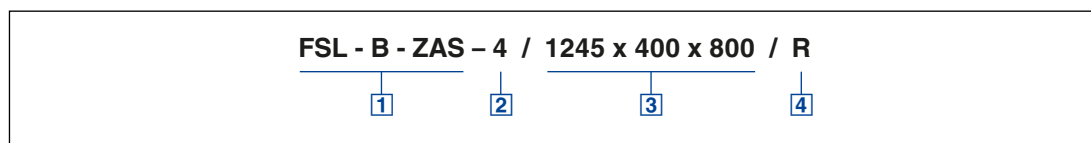
If necessary, the air is heated or cooled by the heat exchanger before it is discharged to the room as an inducing displacement flow.

If necessary, secondary air is added to the fresh air in order to increase the supply air flow rate and hence the thermal output.

The extract air first passes a G3 filter, then flows through the heat exchanger (for heat recovery), the extract air fan and the motorised shut-off damper before it is discharged to the outside as exhaust air.

Order code

FSL-B-ZAS



**1 Type**

**FSL-B-ZAS** Decentralised  
under sill ventilation units

**3 Dimensions [mm]**

B x H x T  
**1245 x 800 x 400**

**2 Heat exchanger**

**2** 2-pipe  
**4** 4-pipe

**4 Control equipment**

No entry: none  
**R** With

Order information

Decentralised ventilation units are technically advanced products of high quality and with a wide range of configuration options. For specification details regarding your project please contact your nearest TROX branch or subsidiary.

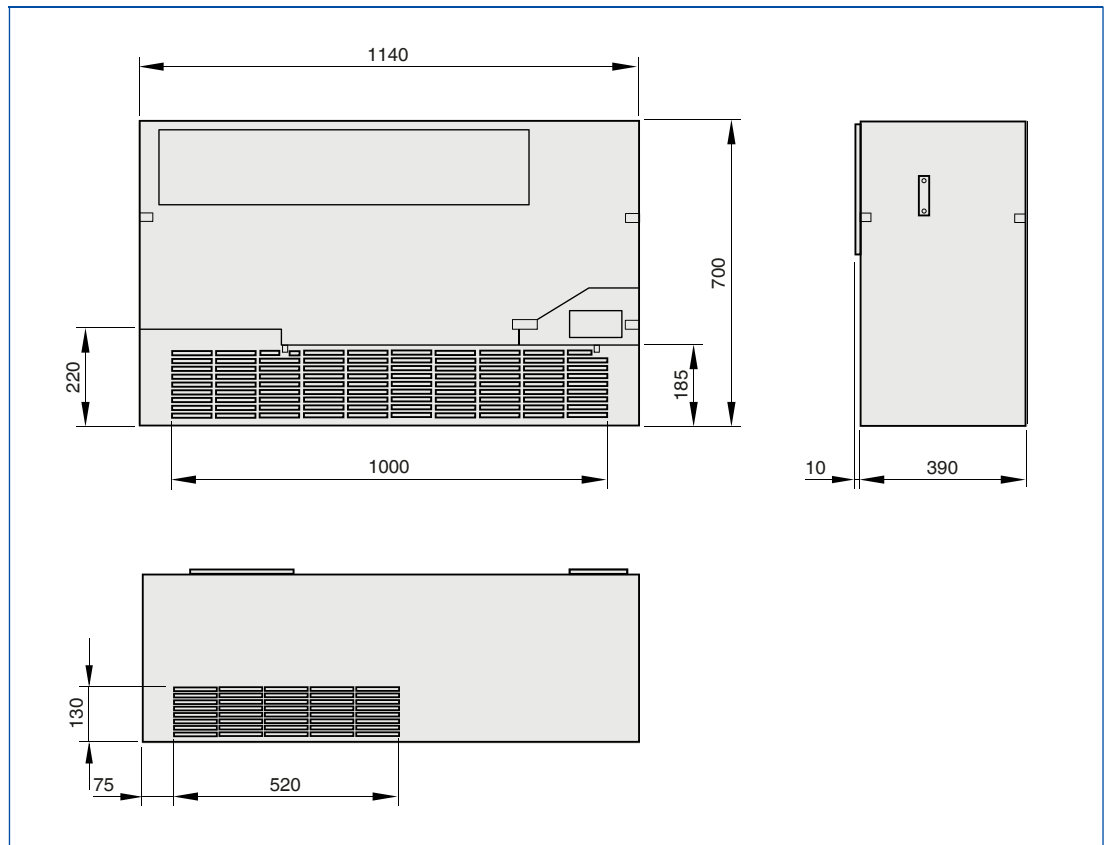
Quick sizing

FSL-B-ZAS (E.ON ERC project)

Supply air flow rate	m <sup>3</sup> /h	100	150	170
Fresh air flow rate	m <sup>3</sup> /h	100	150	170
Total cooling capacity	W	450	680	760
Internal cooling capacity	W	267	401	545
Temperature of the air in the unit	°C	32.0	32.0	32.0
Relative humidity	%	40.0	40.0	40.0
Water content of the dry air	g/kg	11.9	11.9	11.9
Supply air temperature	°C	18	18	18
Condensation	g/h	0	0	0
Chilled water flow rate	l/h	100	180	220
Water temperature, inlet	°C	16	16	16
Water temperature, outlet	°C	19.9	19.2	19.0
Pressure drop, water side	kPa	<3	<8	<11
Total heating capacity	W	1830	2560	2850
Internal heating capacity	W	551	666	710
Temperature of the air in the unit	°C	-12.0	-12.0	-12.0
Supply air temperature	°C	36.5	33.3	32.5
Hot water flow rate	l/h	120	200	250
Water temperature, inlet	°C	60	60	60
Water temperature, outlet	°C	46.7	48.8	50.0
Pressure drop, water side	kPa	<4	<9	<13
Sound power level L <sub>WA</sub>	dB (A)	38	43	46
Sound pressure level with 8 dB room attenuation	dB (A)	30	35	38

Dimensions  
Weight upon request

FSL-B-ZAS (E.ON ERC project)





## Description

This specification text describes the general properties of the product. Texts for variants can be generated with our Easy Product Finder design programme.

Decentralised supply and extract air units of Type FSL-B-ZAS, with secondary air function and with heat recovery and heat exchanger, for installation under the sill or into the façade (using a frame).

## Special features

- Motorised shut-off dampers for fresh air and exhaust air, normally closed (NC) in order to prevent uncontrolled airflows
- Recuperative heat recovery with motorised bypass (heat recovery > 80 %)
- Heat exchanger as 2-pipe or 4-pipe system, with G $\frac{1}{2}$ " union nuts and flat seals
- Meets the hygiene requirements of VDI 6022
- Filter class: F7 for fresh air, G3 for extract air
- Condensate drip tray with condensate drain
- Compact construction, hence particularly suitable for refurbishment projects
- Demand-based ventilation is possible by means of monitoring the room air quality and with dedicated control equipment
- Installation into a frame

## Materials and surfaces

- Casing, filter chamber cover, fans and levelling feet are made of galvanised sheet steel
- Heat exchanger with copper tubes and aluminium fins
- Plate heat exchanger made of aluminium
- Casing is powder-coated RAL 9005, black, or in any other RAL colour
- F7 filter medium made of moisture-resistant glass fibre paper (certified by Eurovent)
- Mineral wool lining to DIN 4102, fire rating class A, faced with glass fibre fabric as a protection against erosion, effective with airflow velocities up to 20 m/s
- Closed cell sealing strips

## Construction

- Powder-coated RAL 9005, black, gloss level 70 %
- P1: Powder-coated in any other RAL colour, gloss level 70 %

## Technical data

- Width: 1245 mm
- Height: 800 mm
- Depth: 400 mm
- Fresh air flow rate: up to 170 m<sup>3</sup>/h
- Supply air flow rate: up to 170 m<sup>3</sup>/h
- Cooling capacity: 760 W
- Heating capacity: 2850 W
- Max. operating pressure, water side: 6 bar
- Max. operating temperature, water side: 75 °C
- Sound power level: 38 – 46 dB(A)
- Supply voltage: 230 V AC  $\pm$  10 %, 50/60 Hz
- Rating: 75 VA
- Power consumption: 44 W with boost level, 20 W with medium speed (nominal volume flow rate)

## Order options

### 1 Type

**FSL-B-ZAS** Decentralised  
under sill ventilation units

### 2 Heat exchanger

- 2** 2-pipe
- 4** 4-pipe

### 3 Dimensions [mm]

B × H × T

- 1245 × 800 × 400**

### 4 Control equipment

- R** No entry: none
- R** With

# Decentralised ventilation

## Basic information and nomenclature



- Product selection
- Principal dimensions
- Nomenclature

# Decentralised ventilation

## Basic information and nomenclature

### Product selection

	Façade ventilation units						
	FSL-U-SEK	FSL-U-ZUS	FSL-U-ZAB	FSL-U-ZAS	FSL-B-SEK	FSL-B-ZUS	FSL-B-ZAB
<b>Installation details</b>							
Under floor (false floor)	●	●	●	●			
Under the sill					●	●	●
<b>Ventilation functions</b>							
Secondary air	●	●		●	●	●	
Supply air			●	●		●	●
Extract air							●
<b>Heat exchanger</b>							
2-pipe or 4-pipe heat exchanger	●	●	●	●	●	●	●
F7 filter			●	●			●
Heat recovery with bypass							
●	Possible						
	Not possible						

### Product selection

	Façade ventilation units					
	FSL-B-ZAS	SCHOOLAIR-B	FSL-V-ZUS	FSL-V-ZAB	SCHOOLAIR-V	SCHOOLAIR-D
<b>Installation details</b>						
Under the sill	●	●				
Vertical installation on an external wall, e.g. adjacent to a window			●	●	●	
Ceiling						●
<b>Ventilation functions</b>						
Secondary air	●		●			
Supply air	●	●		●	●	●
Extract air		●		●	●	●
<b>Heat exchanger</b>						
2-pipe or 4-pipe heat exchanger	●	●	●	●	●	●
F7 filter						
Heat recovery with bypass						
●	Possible					
	Not possible					

# Decentralised ventilation

## Basic information and nomenclature

### Principal dimensions

$L_N$  [mm]  
Nominal length

### Nomenclature

$t_R$  [°C]  
Room temperature

$t_{Pr}$  [°C]  
Primary air temperature

$t_{wK}$  [°C]  
Water flow temperature – cooling

$\dot{V}_{wK}$  [l/h]  
Water flow rate – cooling

$t_{wH}$  [°C]  
Water flow temperature – heating

$t_{wV}$  [°C]  
Water flow temperature

$\dot{V}_{wH}$  [l/h]  
Water flow rate – heating

$\dot{V}_{Pr}$  [m<sup>3</sup>/h]  
Primary air volume flow rate

$\Delta p_r$  [Pa]

Pressure drop, air side of the induction unit

$\dot{Q}_{tot}$  [W]  
Thermal output – total

$\dot{Q}_{wK}$  [W]  
Thermal output, cooling (cooling capacity) – water side

$\dot{Q}_{wH}$  [W]  
Thermal output, heating (heating capacity) – water side

$\dot{Q}_{Pr}$  [W]  
Thermal output – air side

$\Delta t_w$  [K]  
Temperature difference – water circuit

$\Delta p_w$  [kPa]  
Pressure drop – water side

$L_{WA}$  [dB(A)]  
Sound power level

# Decentralised ventilation

## Basic information and nomenclature

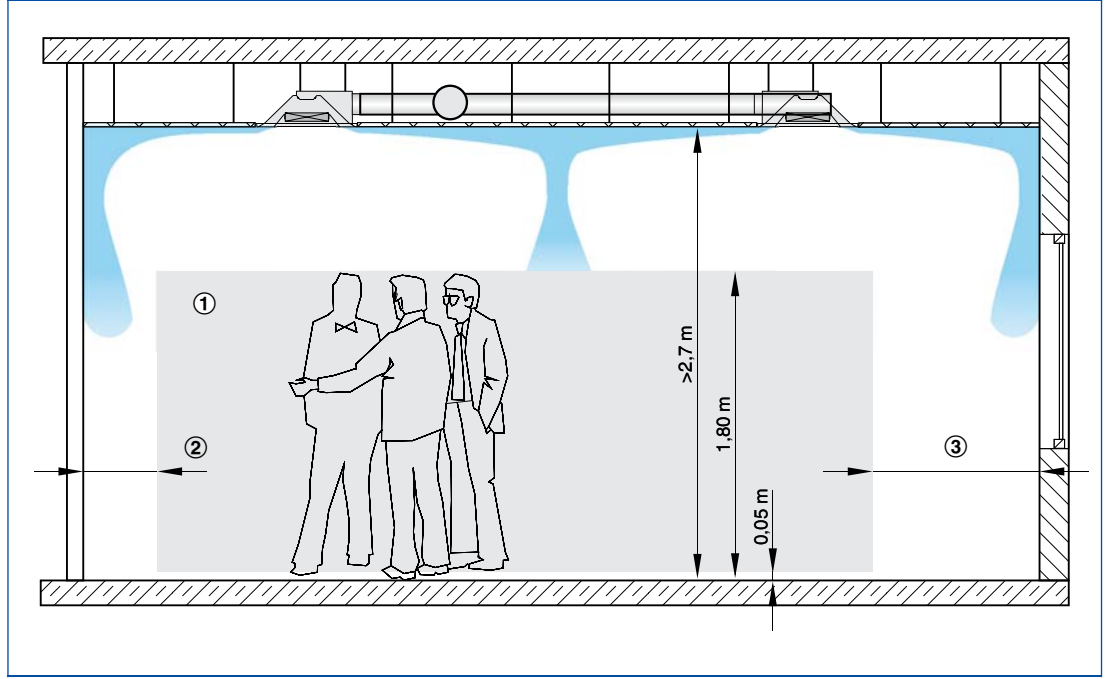
### Types of ventilation

#### Mixed flow

The supply air is discharged from the diffuser into the space with a velocity between 2 and 5 m/s. The resulting air jet mixes with the room air, ventilating the entire space. Mixed flow systems typically provide a uniform temperature

distribution and air quality within the space. The originally high velocity of the turbulent air jet decreases rapidly due to the high induction levels of mixed flow systems.

#### Schematic illustration of mixed flow ventilation

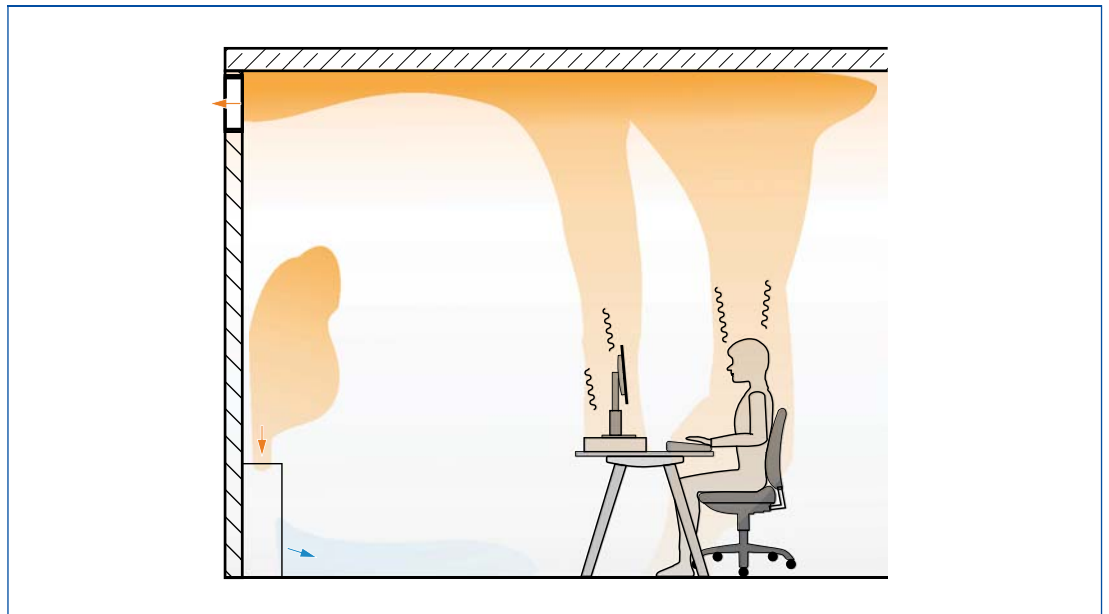


#### Displacement flow

Die Zuluft strömt möglichst bodennah mit velocity between 0.15 and 0.20 m/s and as close as possible to the floor; the result is a pool of fresh air over the entire floor area. The convection from people and other heat sources causes the fresh air from the pool to rise and create comfortable

conditions in the occupied zone. Displacement flow ventilation is characterised by low airflow velocities and low turbulence. The air quality in the occupied zone is very high. The extract air should ideally be removed near the ceiling.

#### Schematic illustration of displacement flow ventilation



# Decentralised ventilation

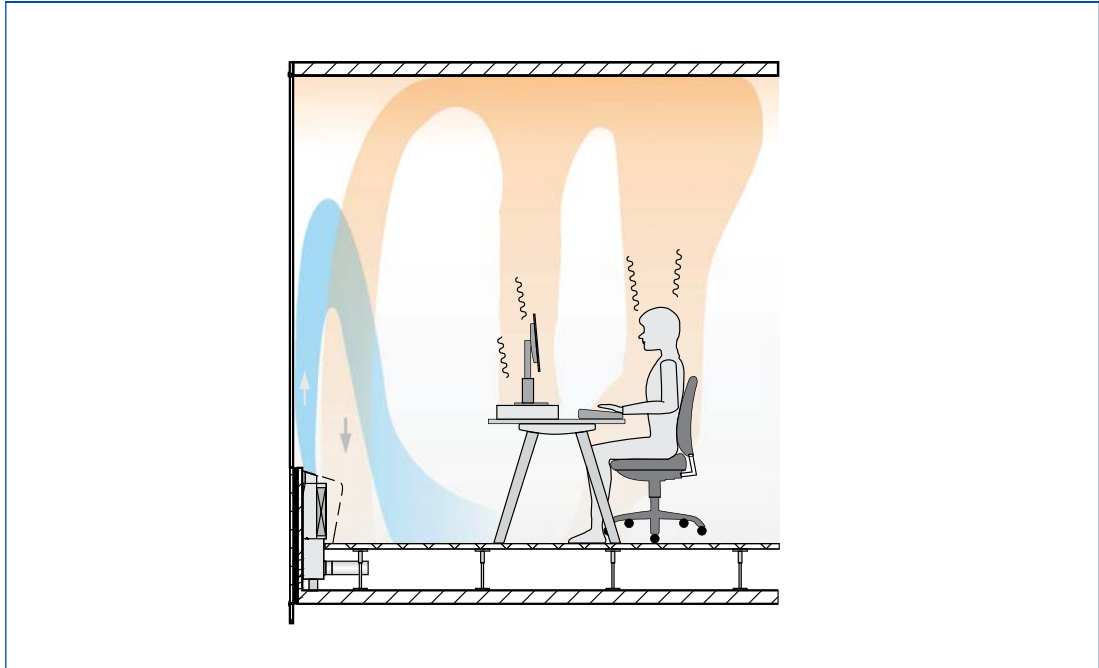
## Basic information and nomenclature

### Inducing displacement flow

The supply air is discharged near the external wall and with a medium velocity between 1.0 and 1.5 m/s. Due to the induction effect the supply air velocity is rapidly reduced such that, in cooling mode, the supply air displaces the room

air over the entire floor area. The convection from people and other heat sources causes the fresh air from the pool to rise and create comfortable conditions in the occupied zone.

### Schematic illustration of inducing displacement flow ventilation



# Decentralised ventilation

## Basic information and nomenclature

### Heat exchanger

#### Heat exchanger

The maximum water-side operating pressure for all heat exchangers is 6 bar.  
The maximum water flow temperature (heating circuit) for all heat exchangers is 75 °C; if flexible hoses are used, the water flow temperature should not exceed 55 °C. Units for other pressures and temperatures are available on request.

The water flow temperature (cooling circuit) should be at least 16 °C such that it does not permanently fall below the dew point. For units with a condensate drip tray the water flow temperature may be reduced to 15 °C.

#### Heat exchanger as 2-pipe system

Air-water systems with a 2-pipe heat exchanger may be used for either heating or cooling. In changeover mode it is possible to use all units within a water circuit exclusively for cooling in summer and exclusively for heating in winter.

#### Heat exchanger as 2-pipe system



#### Heat exchanger as 4-pipe system

Air-water systems with a 4-pipe heat exchanger may be used for both heating and cooling. Depending on the season, i.e. especially in spring and autumn, it may be possible that an office has to be heated in the morning and cooled in the afternoon.

#### Heat exchanger as 4-pipe system

