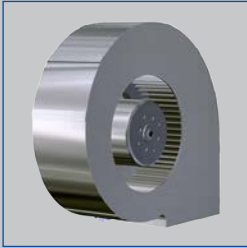
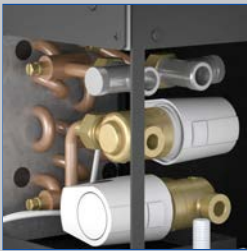


Label ErP



Fan



Water connection



Inspection access panel  
for G3/F7 filter and heat  
recovery



Tested to VDI 6022

# Under sill units

## Type FSL-B-ZAB/SEK



### Supply and extract air unit with heat exchanger and heat recovery, secondary air option, 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
- Plate heat exchanger for heat recovery (air/air), including bypass damper with electric actuator (open-close)
- 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
- Inspection panel simplifies filter change and cleaning of the heat exchanger
- Condensate drip tray with condensate drain
- Motorised shut-off dampers, normally closed (NC)
- Automatic switching to secondary air mode (based on air quality)

#### Optional equipment and accessories

- Modular control system FSL-CONTROL II, specially for decentralised ventilation systems
- Demand-based fresh air volume, free cooling and night purge, depending on control strategy
- Various fixing systems to fix the unit to the floor or wall
- Variable heat recovery
- Powder-coated RAL 9005

Type		Page
FSL-B-ZAB/SEK	General information	B-Z/S – 2
	Function	B-Z/S – 4
	Technical data	B-Z/S – 6
	Quick sizing	B-Z/S – 7
	Specification text	B-Z/S – 8
	Order code	B-Z/S – 9
	Variants	B-Z/S – 10
	Dimensions and weight	B-Z/S – 11
	Installation examples	B-Z/S – 12
	Installation details	B-Z/S – 13
	Basic information and nomenclature	B-Z/S – 14

## Application

### 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 for heating and cooling
- For new buildings, refurbishment projects and revitalisation projects
- Installation under the sill
- Typical installation locations include offices and meeting rooms

### Special characteristics

- Recuperative heat exchanger for heat recovery, including bypass damper with variable electric actuator (open-close)
- Mechanical self-powered volume flow controller for limiting the fresh air flow rate
- 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
- Easy filter change with quick release fasteners,

- no tools required; easy access to the heat exchanger for cleaning
- 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
- 4 levelling feet
- Motorised shut-off dampers for fresh air and exhaust air, normally closed (NC) in order to prevent uncontrolled airflows and the carry over of smoke
- Automatic switching to secondary air mode (only with an air quality sensor) if the room air quality (measured with the integral VOC sensor, for example) is between the previously defined range. The fresh air damper closes, the self-powered secondary air damper opens and the extract air fan is switched off. The unit always starts in secondary air mode, which is more energy efficient.

### Nominal sizes

- 1085 × 630 × 320 mm (B × H × T)

## Description

### Construction

- Powder-coated RAL 9005, black

### Useful additions

- Modular control system FSL-CONTROL II, specially for decentralised ventilation systems
- Connecting hoses

### Construction features

- 2 energy-efficient EC fans with low specific fan powers, SFP = 1 according to EN 13779
- Cross flow plate heat exchanger
- The supply air is discharged to the room as an inducing displacement flow from the lower front part of the unit
- Extract air or secondary 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 powder-coated, black (RAL 9005)
- 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

### Standards and guidelines

- Façade ventilation units of Type FSL-B-ZAB/SEK conform to VDI 6035 and VDMA 24390
- Hygiene certificate to VDI 6022
- Heating/cooling fluid conforms to VDI 2035
- Meets the requirements of EU directive 1253/2014 (ErP).
- Energy efficiency class A

**Maintenance**

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

**Functional description**

Decentralised supply and extract air units for room 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, the volume flow controller 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 a displacement flow.

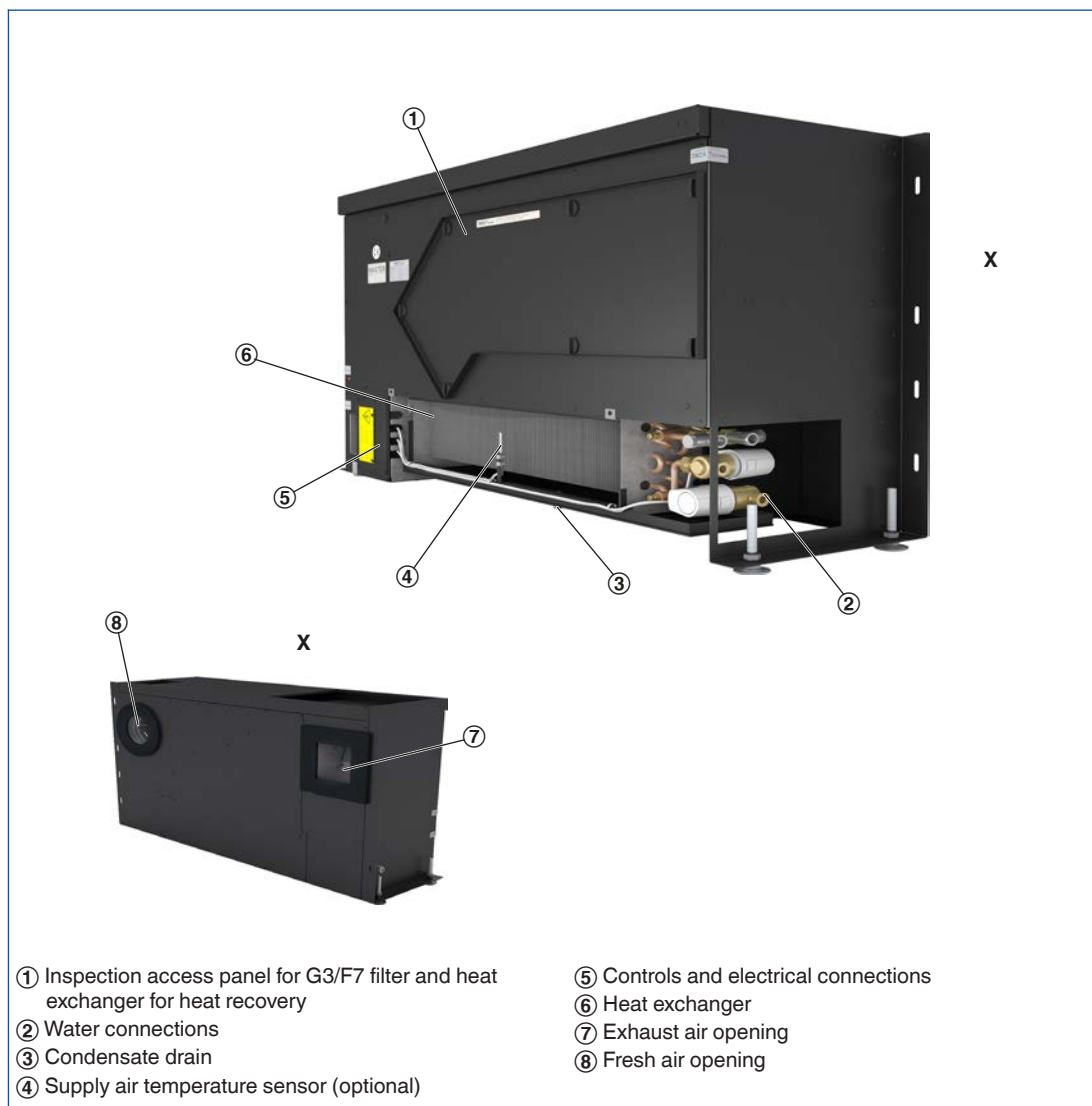
The extract air first passes a G3 filter, then flows through the heat exchanger (for heat recovery), the extract air fan and the motorised shut-off damper before it is discharged to the outside as exhaust air.

Automatic switching to secondary air mode (only with an air quality sensor) if the room air quality is sufficient.

The fresh air damper closes, the self-powered secondary air damper opens and the extract air fan is switched off.

The unit always starts in secondary air mode, which is more energy efficient.

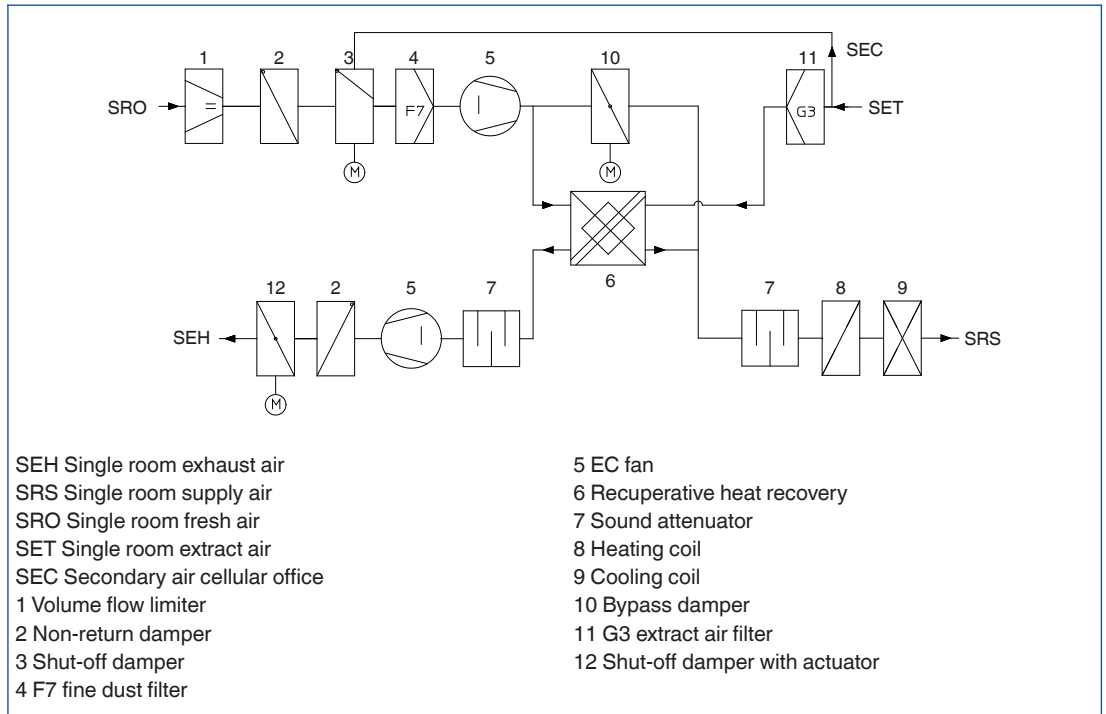
**Schematic illustration of FSL-B-ZAB/SEK**



- ① Inspection access panel for G3/F7 filter and heat exchanger for heat recovery
- ② Water connections
- ③ Condensate drain
- ④ Supply air temperature sensor (optional)

- ⑤ Controls and electrical connections
- ⑥ Heat exchanger
- ⑦ Exhaust air opening
- ⑧ Fresh air opening

Ventilation diagram for FSL-B-ZAB/SEK



<b>Width</b>	1085 mm
<b>Height</b>	630 mm
<b>Depth</b>	320 mm
<b>Fresh air flow rate</b>	Up to 150 m <sup>3</sup> /h
<b>Supply air flow rate</b>	Up to 150 m <sup>3</sup> /h
<b>Cooling capacity</b>	Up to 690 W
<b>Heating capacity</b>	Up to 2600 W
<b>Room cooling capacity</b>	Up to 400 W
<b>Room heating capacity</b>	Up to 1000 W
<b>Max. operating pressure, water side</b>	6 bar
<b>Max. operating temperature</b>	75 °C
<b>Sound power level</b>	31 – 43 dB(A)
<b>Supply voltage</b>	230 V AC ±10 %, 50/60 Hz

Beispielhafte technische Daten

FSL-B-ZAB/SEK (sizing examples)

Supply air flow rate	m <sup>3</sup> /h	80	100	120
Fresh air flow rate	m <sup>3</sup> /h	80	100	120
Total cooling capacity	W	360	460	550
Room cooling capacity	W	216	271	329
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	17.9	17.9	17.8
Condensation	g/h	0	0	0
Chilled water flow rate	l/h	100	130	170
Water temperature, inlet	°C	16	16	16
Water temperature, outlet	°C	19.1	19.0	18.8
Pressure drop – water side	kPa	<3	<3	<3
Total heating capacity	W	1500	1830	2140
Room heating capacity	W	446	521	573
Temperature of the air in the unit	°C	-12.0	-12.0	-12.0
Supply air temperature	°C	37.7	36.6	35.3
Hot water flow rate	l/h	90	130	170
Water temperature, inlet	°C	60	60	60
Water temperature, outlet	°C	45.4	47.7	49.0
Pressure drop – water side	kPa	<3	<3	<3
Sound power level L <sub>WA</sub>	dB(A)	30	34	38
Sound pressure level with 8 dB system attenuation	dB(A)	22	26	30

Decentralised supply and extract air units of Type FSL-B-ZAB/SEK, with heat recovery and heat exchanger, for installation under the sill or on the façade system.

#### Special characteristics

- Recuperative heat exchanger for heat recovery, including bypass damper with variable electric actuator (open-close)
- Mechanical self-powered volume flow controller for limiting the fresh air flow rate
- 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
- Easy filter change with quick release fasteners, no tools required; easy access to the heat exchanger for cleaning
- 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
- 4 levelling feet
- Motorised shut-off dampers for fresh air and exhaust air, normally closed (NC) in order to prevent uncontrolled airflows and the carry over of smoke
- Automatic switching to secondary air mode (only with an air quality sensor) if the room air quality (measured with the integral VOC sensor, for example) is between the previously defined range. The fresh air damper closes, the self-powered secondary air damper opens and the extract air fan is switched off. The unit always starts in secondary air mode, which is more energy efficient.

#### 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 powder-coated, black (RAL 9005)
- 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

#### Technical data

- Width: 1085 mm
- Height: 630 mm
- Depth: 320 mm
- Fresh air flow rate: up to 150 m³/h
- Supply air flow rate: up to 150 m³/h
- Cooling capacity: up to 690 W
- Heating capacity: up to 2600 W
- Room cooling capacity: up to 400 W
- Room heating capacity: up to 1000 W
- Max. operating pressure: 6 bar
- Max. operating temperature: 75 °C
- Sound power level: 31 – 43 dB(A)
- Supply voltage: 230 V AC ±10 %, 50/60 Hz
- Rating: up to 80 VA
- Power consumption: up to 53 W with boost level, up to 23 W with medium speed (nominal volume flow rate)

#### Sizing data

- Fresh air
- $\dot{V}$  \_\_\_\_\_ [m³/h]
- Supply air
- $\dot{V}$  \_\_\_\_\_ [m³/h]
- Room cooling capacity
- $\dot{Q}$  \_\_\_\_\_ [W]
- Room heating capacity
- $\dot{Q}$  \_\_\_\_\_ [W]
- $L_{WA}$  \_\_\_\_\_ [dB(A)]



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

**FSL-B-ZAB/SEK**

<b>FSL - B - ZAB/SEK - 4 - KM / 1085 x 630 x 320 / R / MA - T / B / V / Z / A / HV - R - 0,4 / KV - R - 0,4</b>																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

**1** Type

**FSL-B-ZAB/SEK** Decentralised under sill ventilation units

**2** Heat exchanger

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

**3** Condensate drip tray

**KM** With condensate drain

**4** Dimensions [mm]

B x H x T  
**1085 x 630 x 320**

**5** Control equipment

No entry: none  
**R** With

**5** Control function

**MA** Master (room module and control module)  
**SL** Slave (control module)

**6** Real time clock

No entry: none  
master only  
**T** With

**7** Interface

No entry: none  
master only  
**B** BACnet MS/TP or Modbus RTU  
**L** LonWorks LON-FTT10

**8** Air quality sensor

No entry: none  
master only  
**V** VOC sensor

**9** Supply air temperature sensor

**Z** With

**10** Fresh air temperature sensor

No entry: none  
master only  
**A** With

**11** Heating valve

**HV** With

**11** Lockshield – heating circuit

**R** With

**13** kVS value – heating valve

**0,25**  
**0,40**  
**0,63**  
**1,00**  
**F0,50**

**15** Cooling valve

For 4-pipe systems only  
with  
**KV**

**15** Lockshield – cooling circuit

**R** With

**16** kVS value – cooling valve

**0,25**  
**0,40**  
**0,63**  
**1,00**  
**F0,50**

Product examples

FSL-B-ZAB/SEK



Project solution Laimer Würfel, Munich (frame construction)

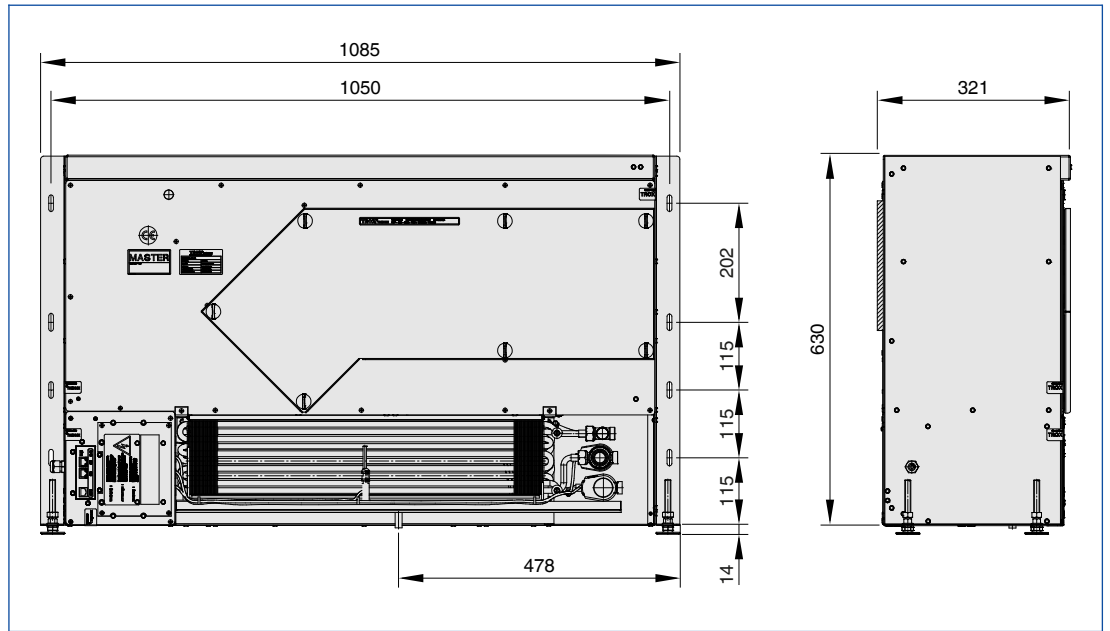


Project solution Bennigsenplatz, Düsseldorf



Weight upon request

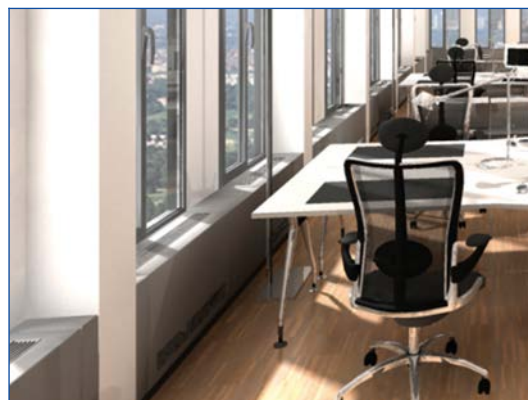
FSL-B-ZAB/SEK, dimensions



Installation example



Installation example



**Installation and commissioning**

- Under sill installation either standing on the floor or hanging on the wall
- Level adjustment using the 4 levelling feet (+40 mm)
- The fresh air connection is provided by two ventilation openings in the façade system or external wall (to be provided by others)
- Weather protection for the fresh air and exhaust air openings 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 right-hand side of the unit when seen from the room
- Vents and drainage by others
- We recommend using flexible hoses to connect the unit to the pipework as they facilitate removing the heat exchanger for cleaning.
- The under sill trim must not obstruct installation or deinstallation of the unit or maintenance access on the front of the unit

**$L_N$  [mm]**

Nominal length

**$L_{WA}$  [dB(A)]**

Sound power level

**$t_{Pr}$  [°C]**

Primary air temperature

**$t_{WV}$  [C°]**

Water flow temperature – cooling/heating

**$t_R$  [C°]**

Room temperature

**$t_R$  [C°]**

Room temperature

**$t_{AN}$  [C°]**

Secondary air intake temperature

**$Q_{Pr}$  [W]**

Thermal output – primary air

**$Q_{tot}$  [W]**

Thermal output – total

**$Q_W$  [W]**

Thermal output – water side, cooling/heating

**$\dot{V}_{Pr}$  [l/s]**

Primary air volume flow rate

**$\dot{V}_{Pr}$  [m³/h]**

Primary air volume flow rate

**$\dot{V}_W$  [l/h]**

Water flow rate – cooling/heating

**$\dot{V}$  [l/h]**

Volume flow rate

**$\Delta t_W$  [K]**

Temperature difference – water

**$\Delta p_W$  [kPa]**

Pressure drop, water side

**$\Delta p_t$  [Pa]**

Total pressure drop, air side

**$\Delta t_{Pr} = t_{Pr} - t_R$  [K]**

Difference between primary air temperature and room temperature

**$\Delta t_{RWV} = t_{WV} - t_R$  [K]**

Difference between water flow temperature and room temperature

**$\Delta t_{Wm-Ref}$  [K]**

Difference between mean water temperature and reference temperature

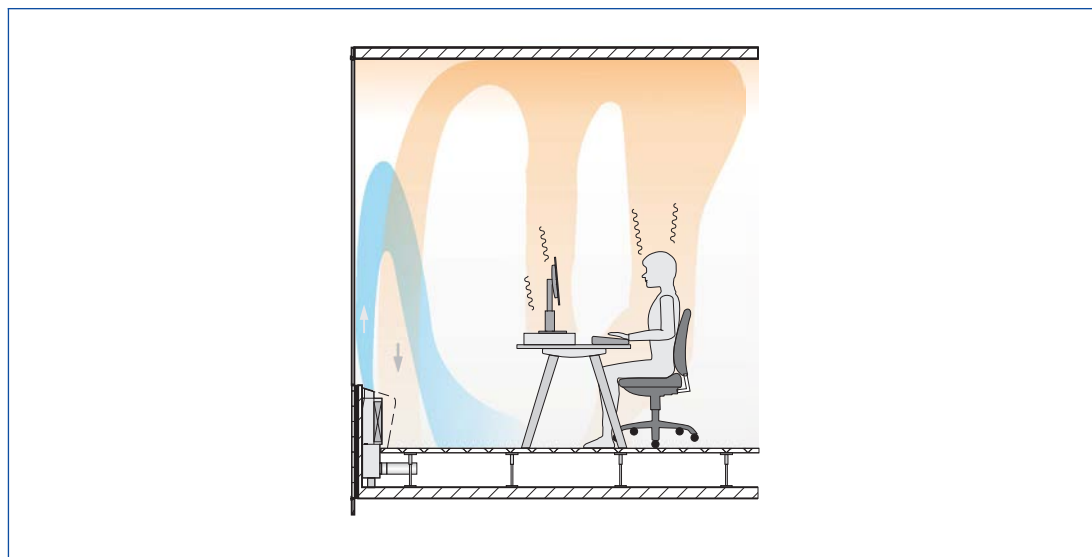
**$L_N$  [mm]**

Nominal length

#### 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.

#### Schematische Darstellung Misch-Quell-Lüftung



#### 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

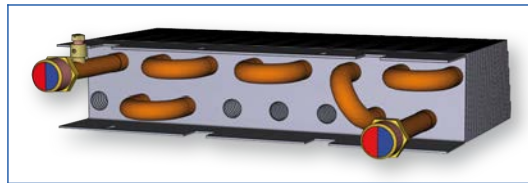
and temperatures are available on request.  
The water flow temperature (cooling circuit) should be at least 16 °C such that it does not permanently fall below the dew point. For units with a condensate drip tray the water flow temperature may be reduced to 15 °C.

#### 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.

#### Wärmeübertrager 2-Leiter-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.

#### Wärmeübertrager 4-Leiter-System

