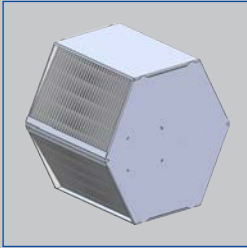
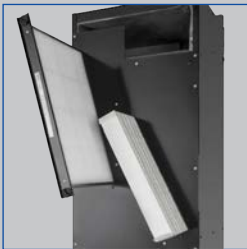


# Vertical units

## Type SCHOOLAIR-V



Cross counter flow heat exchanger for heat recovery



SCHOOLAIR-V, Filter



Levelling foot



Tested to VDI 6022



### Supply and extract air unit with heat exchanger and heat recovery, secondary air option, for vertical installation on an external wall, e.g. adjacent to a window

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

- 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)
- Alternatively: Rotary heat exchanger for heat recovery (air/air), including bypass with electric actuator (modulating or open-close)
- Heat exchanger for heating and cooling as 2-pipe or 4-pipe system
- Unit base of approx. 0.24 m<sup>2</sup>
- Easy filter change, no tools required
- Condensate drip tray with or without 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
- Variable heat recovery
- Powder-coated RAL 9005 (black)

Type		Page
SCHOOLAIR-V	General information	SA-V – 2
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## Application

### Application

- Ventilation and extract ventilation of rooms with a depth up to approx. 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
- Vertical installation on the façade system or an external wall
- Typical applications include classrooms in schools, playrooms in daycare facilities, meeting rooms and offices with a high air change rate

### Special characteristics

- Decentralised ventilation unit for high volume flow rates
- Motorised shut-off dampers for fresh air and exhaust air, normally closed (NC) in order to prevent uncontrolled airflows
- Demand-based ventilation and extract ventilation is possible by means of monitoring the room air quality and with dedicated control equipment
- The type of heat exchanger for heat recovery depends on the unit variant: cross flow plate heat exchanger, cross counter flow plate heat exchanger including bypass damper with electric actuator (open-close or modulating) or

rotary heat exchanger

- 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
- Easy filter change with quick release fasteners, no tools required
- Condensate drip tray with or without condensate drain
- Compact construction, hence particularly suitable for refurbishment projects
- 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 unit always starts in secondary air mode, which is more energy efficient.
- Depending on the unit, an enthalpy heat exchanger for heat recovery may be used

### Nominal sizes

- SCHOOLAIR-V 2-pipe system: 397 × 2160 × 359 mm (B × H × T)
- SCHOOLAIR-V 4-pipe system: 397 × 2350 × 359 mm (B × H × T)
- SCHOOLAIR-V-1800 2-pipe system, 4-pipe system: 600 × 1800 × 359 mm (B × H × T)
- SCHOOLAIR-V-HE 2-pipe system, 4-pipe system: 600 × 2000 × 408 mm (B × H × T)
- SCHOOLAIR-V-HV 2-pipe system, 4-pipe system: 600 × 2200 × 408 mm (B × H × T)

## Description

### Variants

- SCHOOLAIR-V-2L – volume flow rates: 150, 200, 250, 320 m<sup>3</sup>/h with cross flow plate heat exchanger for heat recovery
- SCHOOLAIR-V-4L – volume flow rates: 150, 200, 250, 320 m<sup>3</sup>/h with cross flow plate heat exchanger for heat recovery
- SCHOOLAIR-V-1800 – volume flow rates: 150, 230, 280 and 350 m<sup>3</sup>/h, with cross flow plate heat exchanger for heat recovery
- SCHOOLAIR-V-HE – volume flow rates: 150, 200, 240, 360 m<sup>3</sup>/h with cross flow plate heat exchanger for heat recovery (or enthalpy as an alternative)

- SCHOOLAIR-V-HV – volume flow rates: 200, 300, 400, 500 m<sup>3</sup>/h with rotary heat exchanger for heat recovery

### Construction

- Powder-coated RAL 9005, black

### Accessories

- Outer casing made of wood, with integral supply air and extract air grilles

### 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
- The supply air is discharged to the room as an inducing displacement flow from the lower front 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
- Heat exchanger for heat recovery made of aluminium or plastic (depending on variant)
- 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 SCHOOLAIR-V 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).

#### 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 and the F7 filter.

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

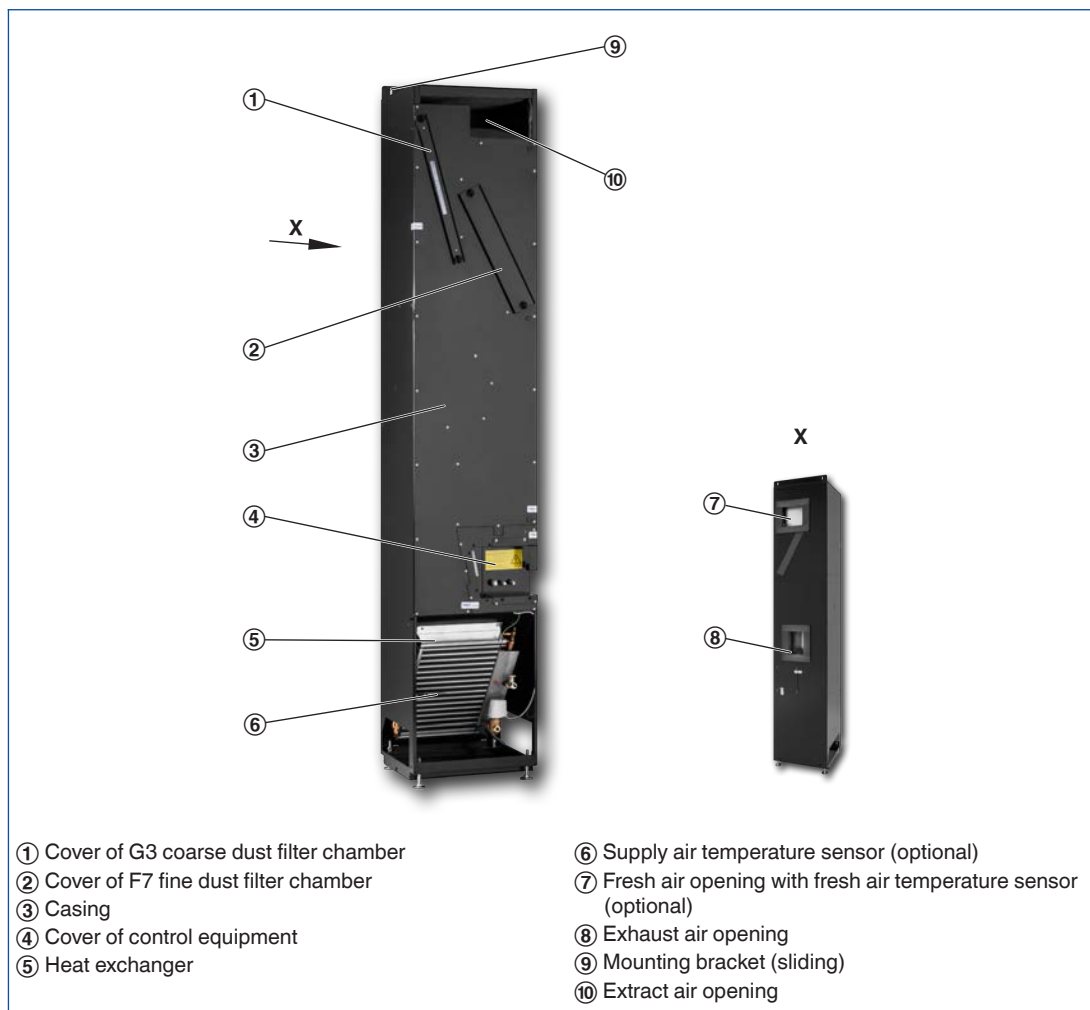
energy efficiency.

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

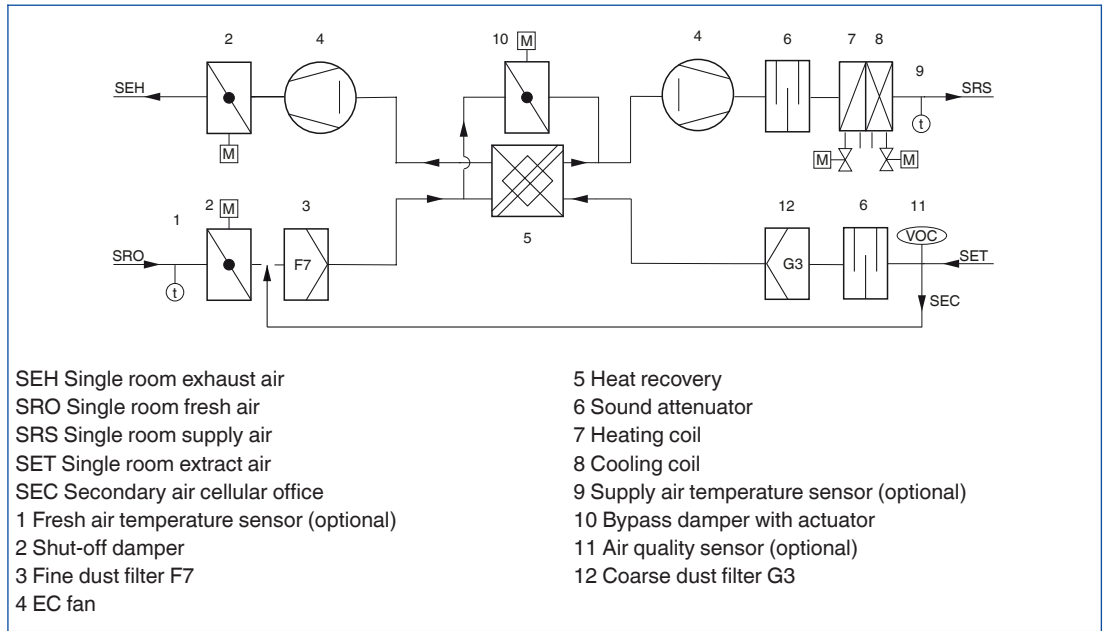
The extract air first passes a G3 filter, then flows through the heat exchanger, the extract air fan and the motorised shut-off damper before it is discharged to the outside as exhaust air.

If the room air quality is good, the unit can be operated in secondary mode only.

**Schematic illustration of SCHOOLAIR-V**



Ventilation diagram for SCHOOLAIR-V (optional control equipment)



<b>Width</b>	397 mm (2-pipe or 4-pipe), 600 mm (2-pipe or 4-pipe, 1800, HE and HV)
<b>Height</b>	1800 mm (2-pipe or 4-pipe, 1800 version), 2000 mm (HE version), 2160 mm (2-pipe), 2200 mm (HV version), 2350 mm (4-pipe)
<b>Depth</b>	359 mm (2-pipe or 4-pipe, 1800 version) 408 mm (2-pipe or 4-pipe HE and HV versions)
<b>Fresh air flow rate</b>	Up to 500 m <sup>3</sup> /h
<b>Supply air flow rate</b>	Up to 500 m <sup>3</sup> /h
<b>Cooling capacity</b>	Up to 1685 W
<b>Heating capacity</b>	Up to 6020 W
<b>Max. operating pressure, water side</b>	6 bar
<b>Max. operating temperature</b>	75 °C
<b>Sound power level</b>	31 – 50 dB(A)
<b>Supply voltage</b>	230 V AC ±10 %, 50/60 Hz
<b>Weight</b>	From 80 kg

SCHOOLAIR-V-0 (sizing examples)

Supply air flow rate	m <sup>3</sup> /h	150	200	250	320
Fresh air flow rate	m <sup>3</sup> /h	150	200	250	320
Total cooling capacity	W	From 680	From 900	From 1130	From 1440
Room cooling capacity	W	From 401	From 534	From 668	From 844
Temperature of the air in the unit	°C	32	32	32	32
Rel. humidity	%	40	40	40	40
Water content of the dry air	g/kg	11.9	11.9	11.9	11.9
Supply air temperature	°C	18	18	18	18.1
Condensation	g/h	0	0	0	0
Chilled water flow rate	l/h	80	130	190	250
Water temperature, inlet	°C	16	16	16	16
Water temperature, outlet	°C	23.3	22	21.1	21
Pressure drop – water side	kPa	<3	<5	<8	<12
Total heating capacity	W	2780	3700	4490	5470
Room heating capacity	W	862	1136	1303	1422
Temperature of the air in the unit	°C	-12	-12	-12	-12
Supply air temperature	°C	37.2	37.0	35.6	33.3
Hot water flow rate	l/h	90	150	200	250
Water temperature, inlet	°C	60	60	60	60
Water temperature, outlet	°C	32.9	38.5	40.4	40.9
Pressure drop – water side	kPa	<3	<5	<7	<11
Sound power level L <sub>WA</sub>	dB(A)	31	36	41	46
Sound pressure level with 8 dB system attenuation	dB(A)	23	28	33	38

SCHOOLAIR-V (1800 mm) (sizing examples)

Supply air flow rate	m <sup>3</sup> /h	150	230	280	350
Fresh air flow rate	m <sup>3</sup> /h	150	230	280	350
Total cooling capacity	W	684	1060	1310	1590
Room cooling capacity	W	406	630	786	935
Temperature of the air in the unit	°C	32.0	32.0	32.0	32.0
Rel. humidity	%	40.0	40.0	40.0	40.0
Water content of the dry air	g/kg	11.9	11.9	11.9	11.9
Supply air temperature	°C	17.9	17.8	17.6	18.0
Condensation	g/h	0	0	0	0
Chilled water flow rate	l/h	60	120	180	210
Water temperature, inlet	°C	16	16	16	16
Water temperature, outlet	°C	25.8	23.6	22.3	22.5
Pressure drop – water side	kPa	1.1	3.8	8	10.4
Total heating capacity	W	2950	4230	4900	5630
Room heating capacity	W	907	1122	1150	1005
Temperature of the air in the unit	°C	-12.0	-12.0	-12.0	-12.0
Supply air temperature	°C	40.1	36.6	34.3	30.6
Hot water flow rate	l/h	100	170	200	210
Water temperature, inlet	°C	60	60	60	60
Water temperature, outlet	°C	34.4	38.4	38.8	36.8
Pressure drop – water side	kPa	4.8	12.3	16.5	18.1
Sound power level L <sub>WA</sub>	dB(A)	31	38	42	47
Sound pressure level with 8 dB system attenuation	dB(A)	23	30	34	39

**SCHOOLAIR-V-HE (sizing examples)**

Supply air flow rate	m <sup>3</sup> /h	150	200	240	360
Total heating capacity (without heat recovery)	W	2960	3820	4520	6020
Room heating capacity	W	671	781	890	675
Temperature of the air in the unit	°C	-16	-16	-16	-16
Supply air temperature	°C	35.4	33.7	33.1	27.5
Quantity of condensate	g/h	510	690	830	1180
Hot water flow rate	l/h	75	110	150	200
Water temperature, inlet	°C	60	60	60	60
Water temperature, outlet	°C	26	30	34	34
Pressure drop – water side	kPa	2.9	5.7	10.0	16.7
Sound power level L <sub>WA</sub>	dB(A)	36	40	43	50
Sound pressure level with 8 dB system attenuation	dB(A)	28	32	35	42

**SCHOOLAIR-V-HV (sizing examples)**

Supply air flow rate	m <sup>3</sup> /h	200	300	400	500
Total heating capacity (without heat recovery)	W	1300	1960	2530	3150
Room heating capacity	W	508	772	962	1169
Temperature of the air in the unit	°C	10.0	10.0	10.0	10.0
Supply air temperature	°C	28.6	28.7	28.2	28.0
Hot water flow rate	l/h	35	60	85	120
Water temperature, inlet	°C	60	60	60	60
Water temperature, outlet	°C	27.8	31.7	34.1	37.2
Pressure drop – water side	kPa	2	5	9.5	17



Supply and extract air unit with heat exchanger and heat recovery, secondary air option (based on air quality), for vertical installation on an external wall, e.g. adjacent to a window.

#### Special characteristics

- Decentralised ventilation unit for high volume flow rates
- Motorised shut-off dampers for fresh air and exhaust air, normally closed (NC) in order to prevent uncontrolled airflows
- Demand-based ventilation and extract ventilation is possible by means of monitoring the room air quality and with dedicated control equipment
- The type of heat exchanger for heat recovery depends on the unit variant: cross flow plate heat exchanger, cross counter flow plate heat exchanger including bypass damper with electric actuator (open-close or modulating) or rotary heat exchanger
- 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
- Condensate drip tray with or without condensate drain
- Compact construction, hence particularly suitable for refurbishment projects
- 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 unit always starts in secondary air mode, which is more energy efficient.
- Depending on the unit, an enthalpy heat exchanger for heat recovery may be used

#### 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
- Heat exchanger for heat recovery made of aluminium or plastic (depending on variant)
- 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: 397 mm (2-pipe or 4-pipe), 600 mm (2-pipe or 4-pipe, 1800, HE and HV)
- Height: 1800 mm (2-pipe or 4-pipe, 1800 version), 2000 mm (HE version), 2160 mm (2-pipe), 2200 mm (HV version), 2350 mm (4-pipe)
- Depth: 359 mm (2-pipe or 4-pipe, 1800 version) 408 mm (2-pipe or 4-pipe HE and HV versions)
- Fresh air flow rate: up to 500 m<sup>3</sup>/h
- Supply air flow rate: up to 500 m<sup>3</sup>/h
- Cooling capacity: up to 1685 W
- Heating capacity: up to 6020 W
- Max. operating pressure: 6 bar
- Max. operating temperature: 75 °C
- Sound power level: 31 – 50 dB(A)
- Supply voltage: 230 V AC ±10 %, 50/60 Hz
- Weight: from 80 kg
- Rating: SCHOOLAIR-V-2L: 136 VA, SCHOOLAIR-V-4L: 117 VA, SCHOOLAIR-V-1800: 141 VA, SCHOOLAIR-V-HE: 208 VA, SCHOOLAIR-V-HV: ??? VA
- Power consumption with nominal air volume: SCHOOLAIR-V-2L: 44 W, SCHOOLAIR-V-4L: 45 W, SCHOOLAIR-V-1800: 46 W, SCHOOLAIR-V-HE: 42 W, SCHOOLAIR-V-HV: ??? W

#### Sizing data

- Fresh air
- $\dot{V}$  \_\_\_\_\_ [m<sup>3</sup>/h]
- Supply air
- $\dot{V}$  \_\_\_\_\_ [m<sup>3</sup>/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.

### SCHOOLAIR-V

SCHOOLAIR - V - 0 - 2 / KM / 1590 x 650 x 420 / R / MA - T / B / V / Z / A / HV - R - 0,4 / KV - R - 0,4	
1	2 3 4
5	6 7 8 9 10 11 12 13 14 15 16 17 18

#### 1 Type

**SCHOOLAIR-V** Vertical ventilation unit

#### 2 Variant

No entry: standard

**HE** High heat recovery percentage

**HV** High volume flow rate

#### 3 Heat exchanger

**2** 2-pipe

**4** 4-pipe

#### 4 Condensate drip tray

No entry: none

**KM** with condensate drain

#### 5 Dimensions [mm]

B x H x T

**397 x 2160 x 359** (2-pipe)

**397 x 2350 x 359** (4-pipe)

**604 x 1800 x 359** (2- or 4-pipe, length 1800)

**600 x 2000 x 408** (2- or 4-pipe, construction HE)

**600 x 2200 x 408** (2- or 4-pipe, construction HV)

#### 6 Control system

No entry: none

**R** With

#### 7 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

#### 15 kVS value – heating valve

**0,25**

**0,40**

**0,63**

**1,00**

**F0,50**

#### 16 Cooling valve

For 4-pipe systems only

**KV** with

#### 15 Lockshield – cooling circuit

**R** With

#### 16 kVS value – cooling valve

**0,25**

**0,40**

**0,63**

**1,00**

**F0,50**

Product examples

SCHOOLAIR-V 2L



SCHOOLAIR-V 4L



SCHOOLAIR-V-1800

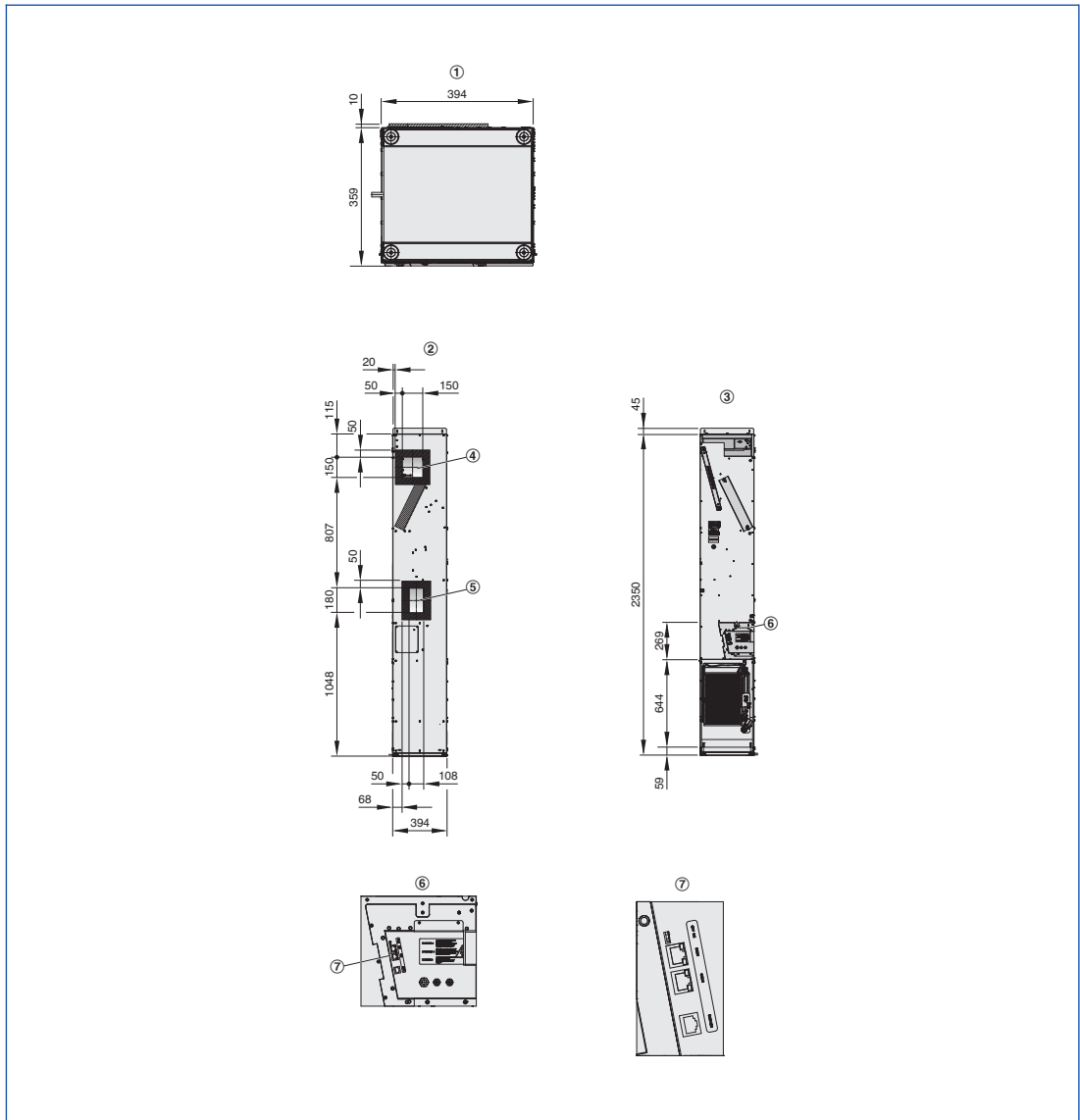


SCHOOLAIR-V-HV

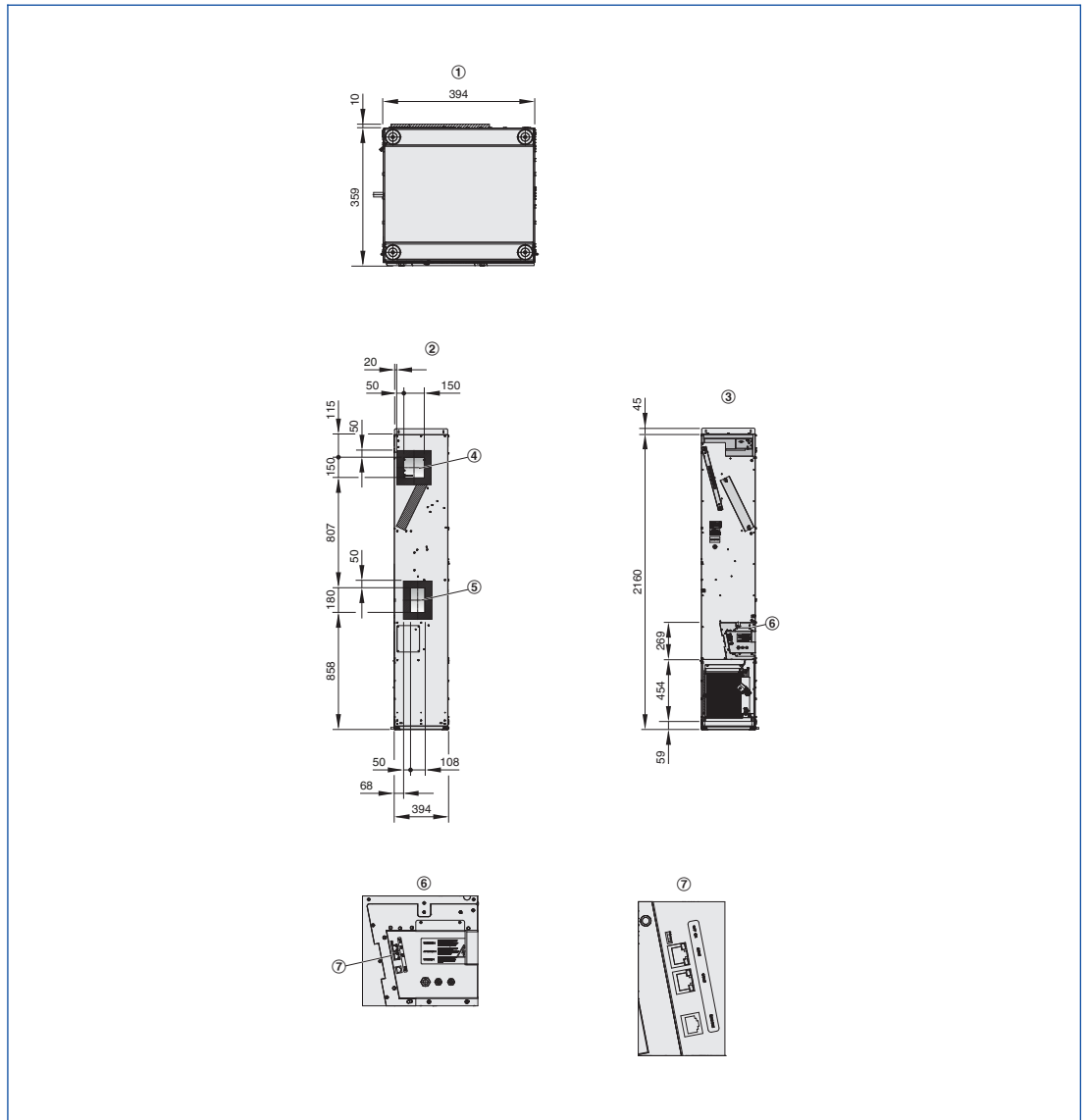


Weight: 80 kg

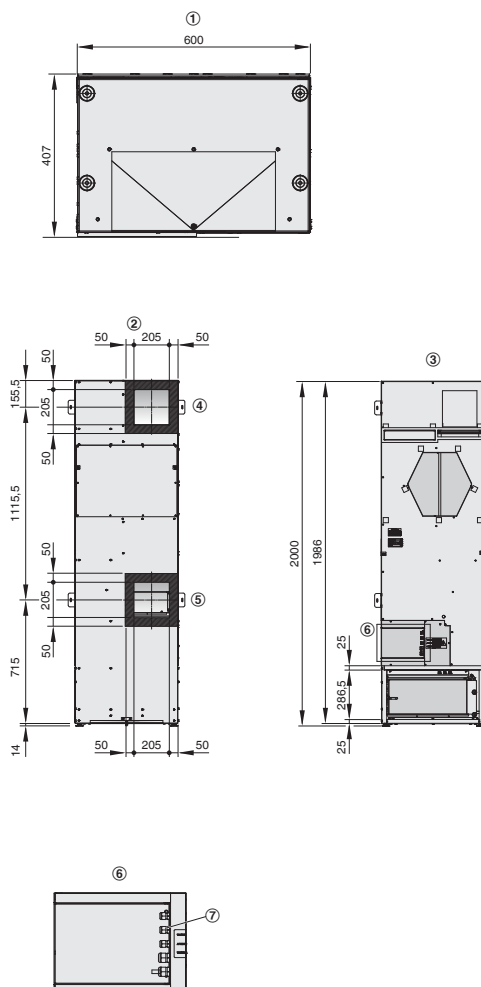
SCHOOLAIR-V-2350 4L FSL-CONTROL II



SCHOOLAIR-V-2160 2L FSL-CONTROL II

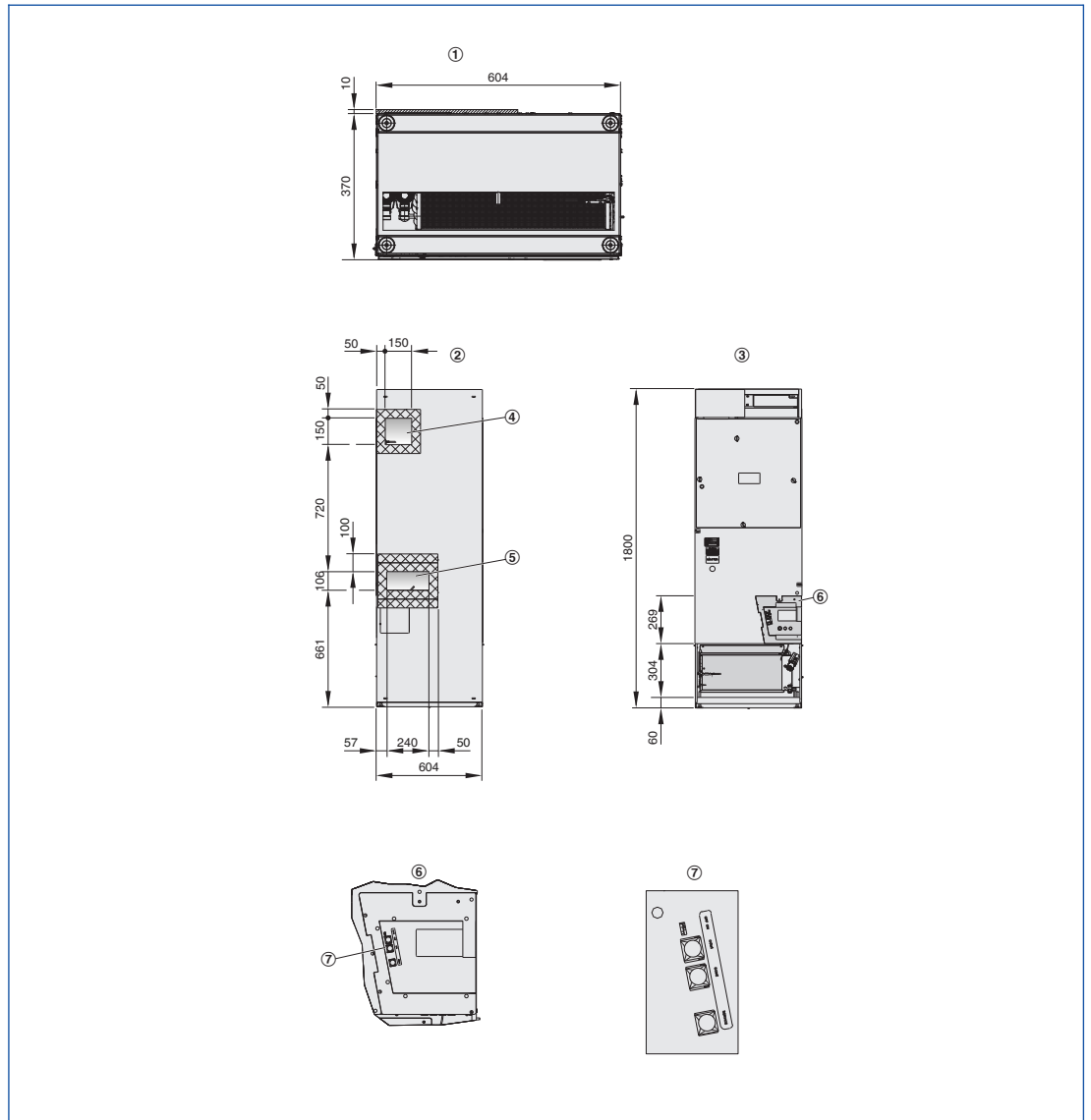


SCHOOLAIR-V-HE

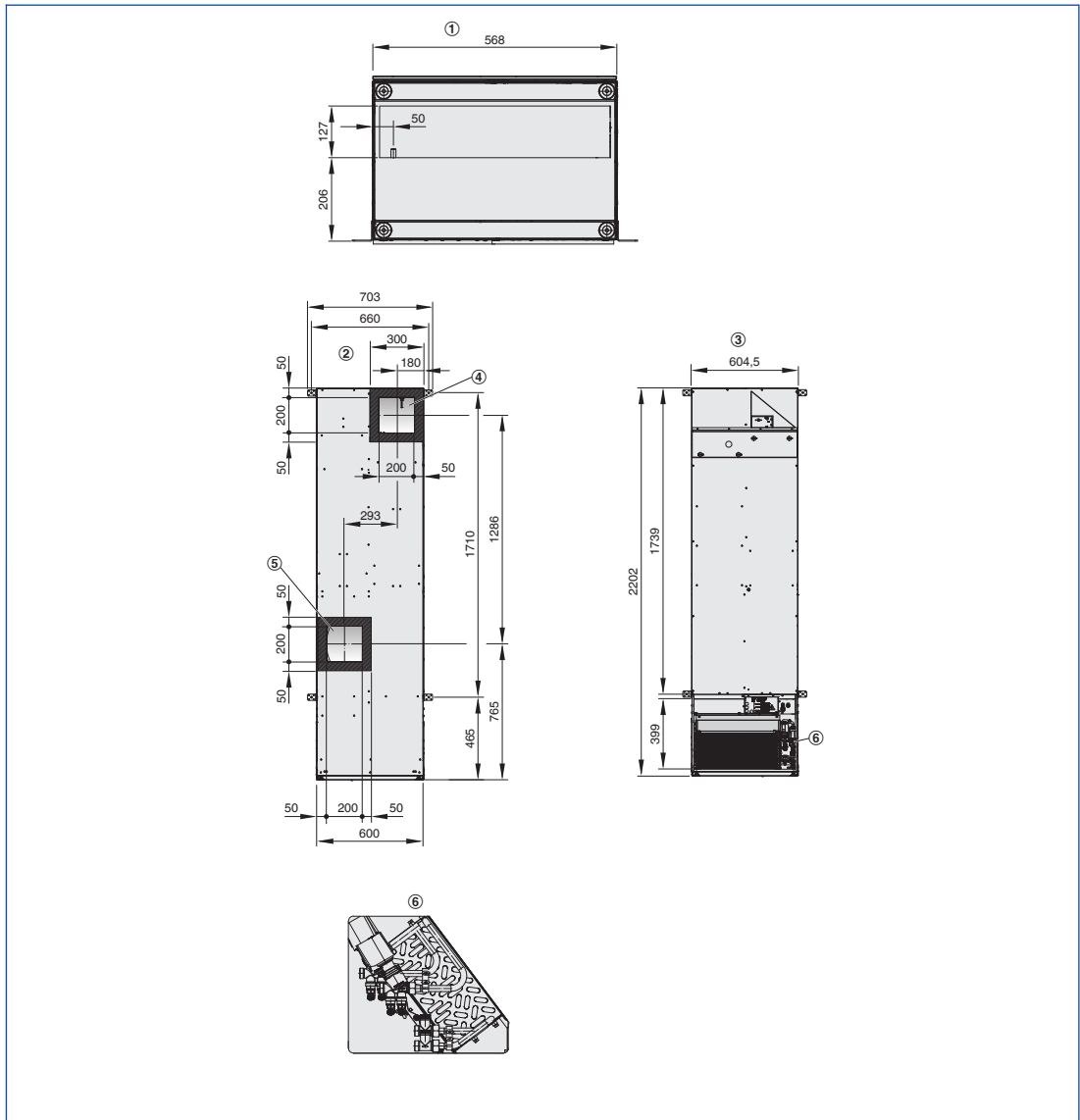


- ① Seen from below
- ② View from outside (façade)
- ③ Side facing the room
- ④ Fresh air opening with fresh air temperature sensor (optional)
- ⑤ Exhaust air opening
- ⑥ Detail electrical connections
- ⑦ Electrical connections 4-pipe system

Schoolair-V-1800 2L-4L



SCHOOLAIR-V-HV





Installation example



Installation example



Installation example



**Installation and commissioning**

- Vertical installation (floor standing) on the façade system or an external wall, e.g. adjacent to a window
- Level adjustment using the 4 levelling feet (+40 mm)
- 1 adjustable mounting bracket to screw-fix the unit to the wall
- Weather protection for the fresh air and exhaust air openings to be provided by others
- The fresh air connection is provided by two ventilation openings in the façade system or external wall (to be provided by others), preferably sloping towards the outside
- Free area of ventilation openings: 0.05 m<sup>2</sup> for each opening
- 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
- The electrical connection is on the lower left when seen from the room
- 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]**

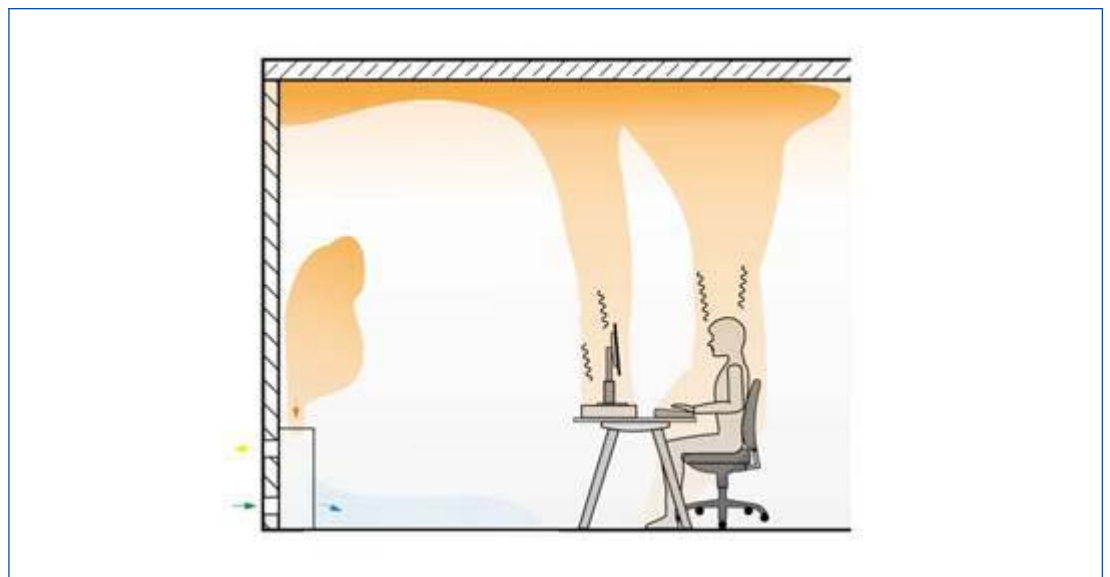
Primary air volume flow rate

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

Water flow rate – cooling/heating

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

**Schematic illustration of inducing displacement flow ventilation**



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.

#### 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

