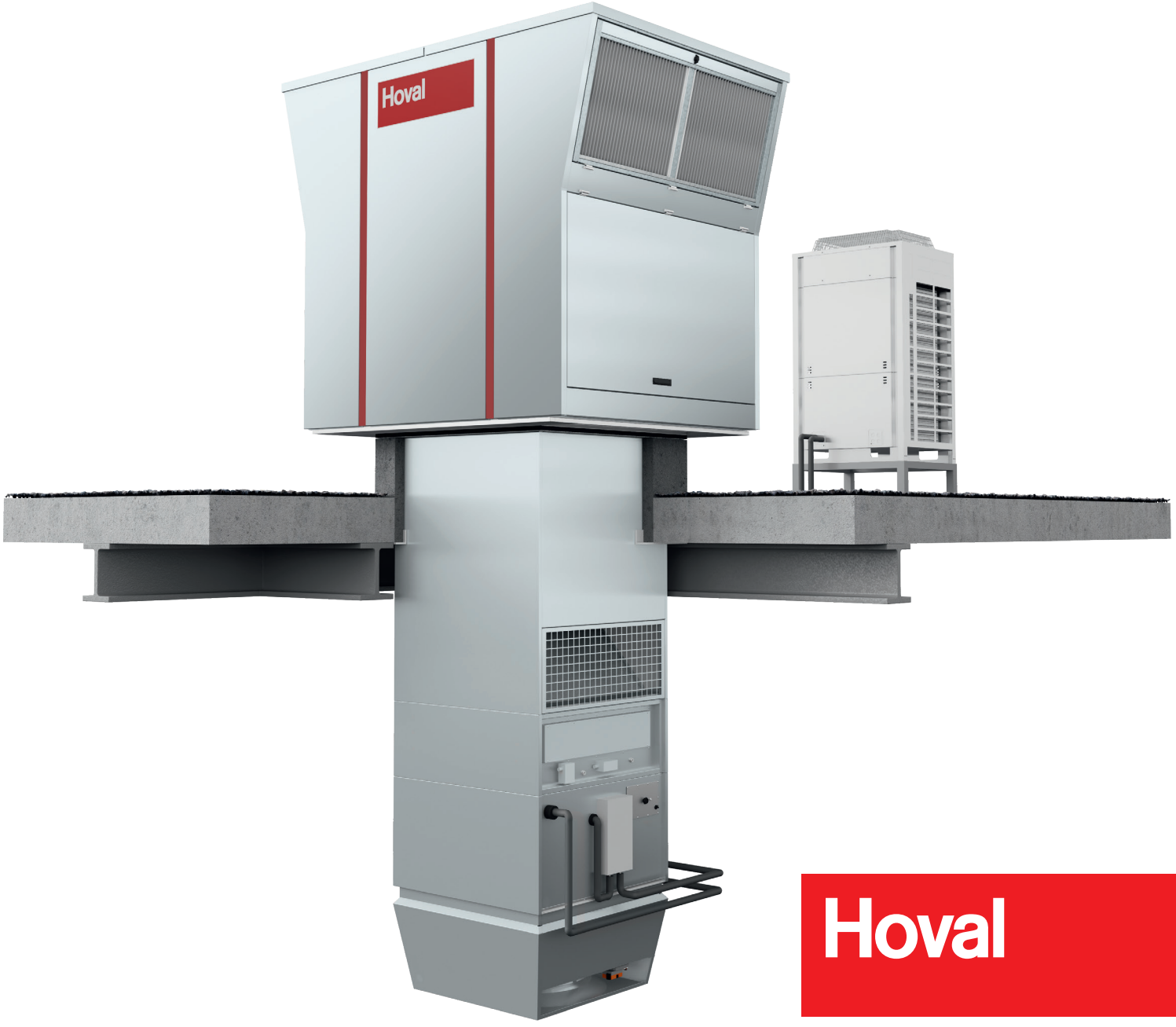
Hoval Indoor Climate Systems
RoofVent® RP

Supply and extract air handling units with efficient air distribution for heating and cooling with decentralised heat pump

Design handbook



Hoval

Hoval Indoor Climate Systems

Efficient. Flexible. Reliable.

Efficient. Flexible. Reliable.

Hoval indoor climate systems are decentralised systems for heating, cooling and ventilating halls for industrial, commercial and leisure applications. The systems have a modular structure. One system comprises several ventilation units which are spread around the room. These units are equipped with reversible heat pumps and gas-fired heat exchangers for decentralised heat and cold generation, or they heat and cool with a connection to a central energy supply.
Tailored control systems complete the system and ensure the effective combination and optimal use of all resources.

Diverse range of units ensures flexibility
Different types of ventilation units can be combined to create the perfect system for the project in question:
- RoofVent® supply and extract air handling units
- TopVent® supply air units
- TopVent® recirculation units

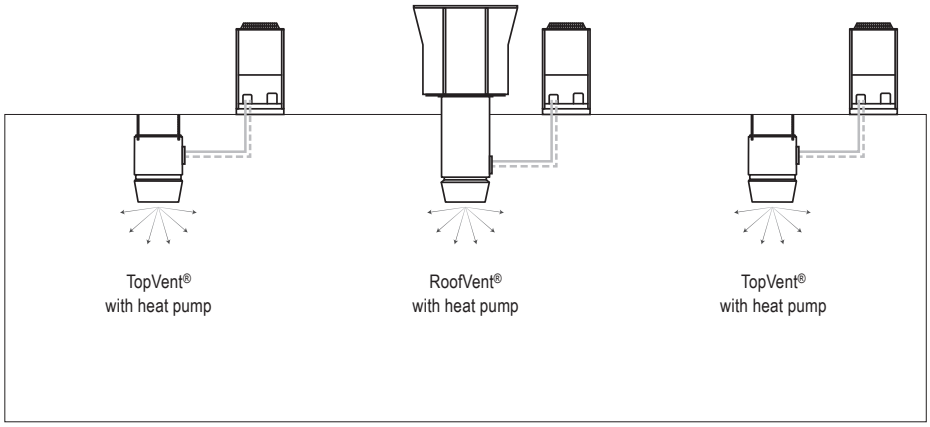
The number of supply and extract air handling units depends on how much fresh air is required in order to create a comfortable atmosphere for people in the building. Recirculation units cover additional heat or cool demand as required. A broad range of unit types and sizes with heating and cooling coils in various output levels means that the overall output of the system can be scaled to whatever level is required.
Specially designed unit versions are also available for halls with particularly humid or oily extract air.
Furthermore, there is a range of units available which have been expressly developed for very specific purposes. ProcessVent units, for example, are coupled with extract air purification systems in industrial halls and recover heat from process air.

Draught-free air distribution
A key feature of Hoval indoor climate units is the patented vortex air distributor, known as the Air-Injector. It is controlled automatically and changes the blowing angle of the air continuously between vertical and horizontal. The highly efficient air supply system has many advantages:
- It provides a high level of comfort during heating and cooling. No draughts develop in the hall.
- The efficient and even air distribution ensures that the indoor climate units cover a large area.
- The Air-Injector keeps the temperature stratification in the room low, thus minimising heat loss through the roof.

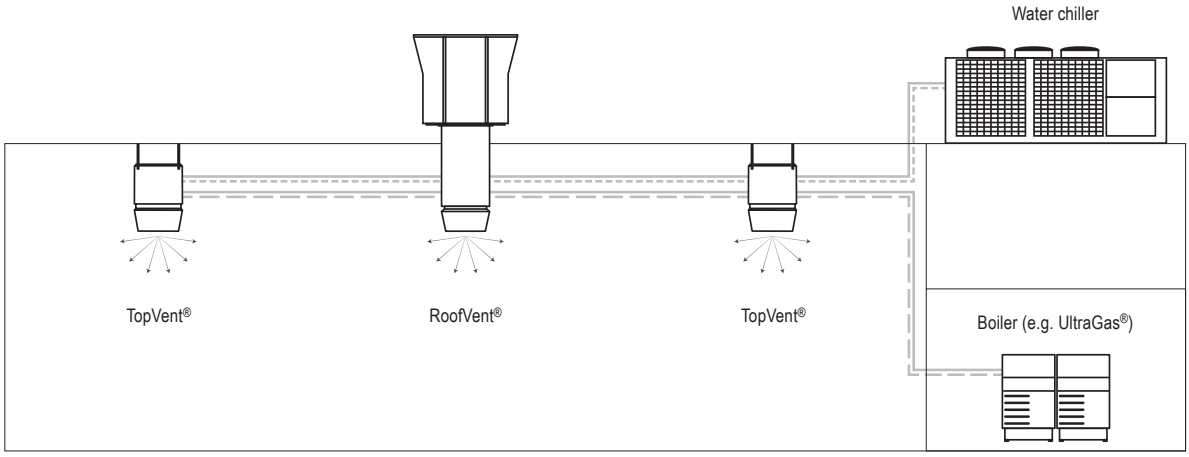
Control with specialist expertise
The TopTronic® C control system, which was specifically developed for Hoval indoor climate systems, regulates the separate units individually and controls them based on zones. This enables optimal adjustment to the local requirements of the different usage areas in the building. The patented control algorithm optimises energy use and ensures maximum comfort and hygiene levels. Clear interfaces make it easy to connect the system to the building management system.
Simpler control systems are also available for units that are only used for supply air or air recirculation.

Competent and reliable
Hoval will support you and provide expert knowledge throughout all project phases. You can rely on comprehensive technical advice when it comes to planning Hoval indoor climate systems and on the skills of the Hoval technicians during the installation, commissioning and maintenance of the system.

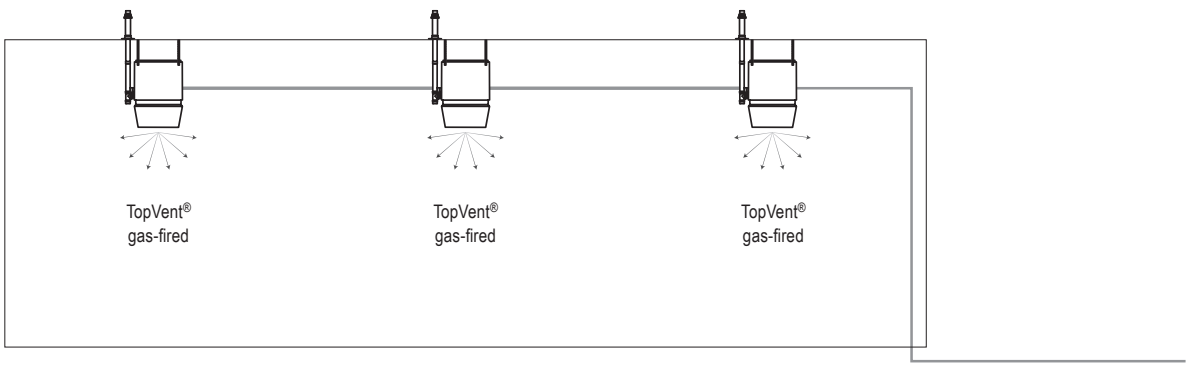
System with decentralised heat and cold generation with heat pump



System with central heat and cold generation



System with decentralised heat generation with gas-fired heat exchanger



RoofVent® RP

Supply and extract air handling units with efficient air distribution for heating and cooling with decentralised heat pump

1 Use

1.1 Intended use

RoofVent® RP units are supply and extract air handling units for use in tall, single-floor halls. They have the following functions:

- Fresh air supply
- Extract air removal
- Heating and cooling with heat pump
- Supplementary heating with electric heating coil (option)
- Supplementary heating with hot water (with connection to a hot water supply, option)
- Energy recovery with highly efficient plate heat exchanger
- Filtering of the fresh air and the extract air
- Air distribution with adjustable Air-Injector

RoofVent® RP units are equipped with an air/air heat pump system which generates both heat and cold decentrally. In this way, they utilise the energy in the ambient air for environmentally friendly heating and cooling of the hall. The indoor climate system is designed to be completely decentralised, which offers key advantages:

- Quick and easy planning
- Low investment costs as a pipe network is not required for heating and cooling supply
- Reliable system operation due to redundancy in case of unit failure

The Hoval TopTronic® C integrated control system ensures energy-efficient, demand-based operation of Hoval indoor climate systems.

Intended use also includes compliance with the operating instructions. Any usage over and above this use is considered to be not as intended. The manufacturer can accept no liability for damage resulting from improper use.

1.2 User group

The units are only allowed to be installed, operated and maintained by authorised and instructed personnel who are well acquainted with the units and are informed about possible dangers.

The operating instructions are for operating engineers and technicians as well as specialists in building, heating and ventilation technology.

2 Construction and operation

2.1 Construction

The RoofVent® RP unit consists of the following components:

Roof unit with energy recovery

Self-supporting casing for mounting on the roof frame; the double-shell design guarantees good thermal insulation and high stability. As part of the TopTronic® C control system, the control block is an integral component of the roof unit. The following components are installed in an accessible position behind the supply air access door:

- Unit controller: this component controls the unit including the air distribution according to the specifications of the control zone and regulates the supply air temperature using cascade control. The unit controller is connected to the other components of the TopTronic® C control system via system bus.
- High-voltage section
- Low-voltage section

Below-roof unit

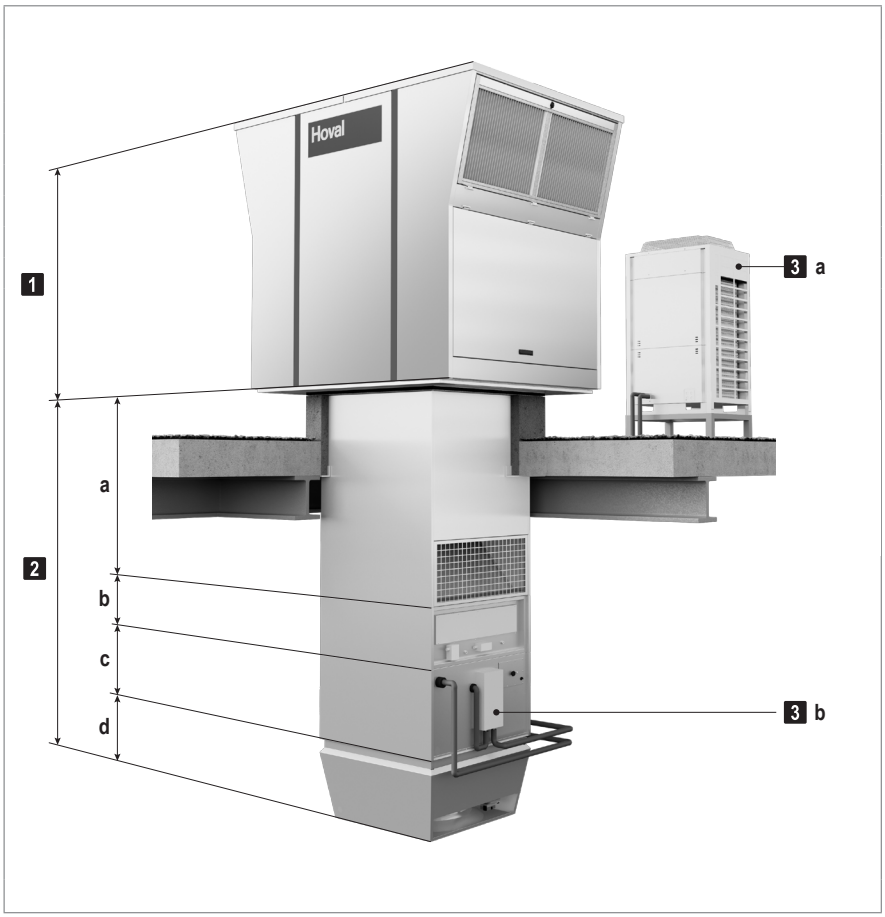
The below-roof unit comprises the following components:

- Connection module:
  The connection module is available in 4 lengths per unit size for adapting the unit to local installation conditions. As part of the TopTronic® C control system, the connection box is an integral component of the connection module. The connection box has a direct plug connection to the control block in the roof unit via the wiring harness.
- Supplementary heater with electric heating coil (option):
  To support the heat pump at very low outside temperatures
- Supplementary heater with hot water (option):
  To support the heat pump at very low outside temperatures
- Heating/cooling section:
  For heating and cooling the supply air with the heat pump
- Air-Injector:
  Patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area

Heat pump system

The heat pump system consists of the following components:

- Reversible condensing unit
- Communication module
- Expansion valve



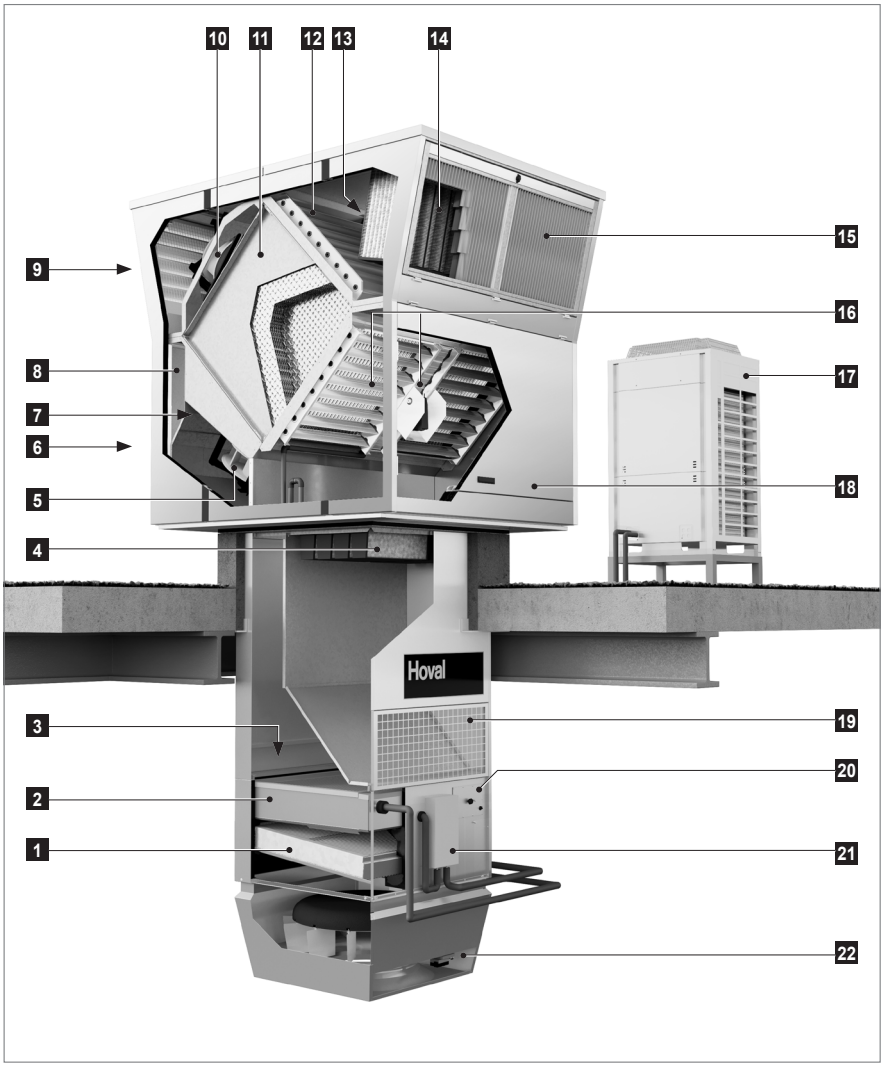
1 Roof unit with energy recovery

2 Below-roof unit
- **a** Connection module
- **b** Supplementary heater (option)
- **c** Heating/cooling section
- **d** Air-Injector

3 Heat pump system
- **a** Reversible condensing unit
- **b** Expansion valve
- **c** Communication module (installed in the roof unit)

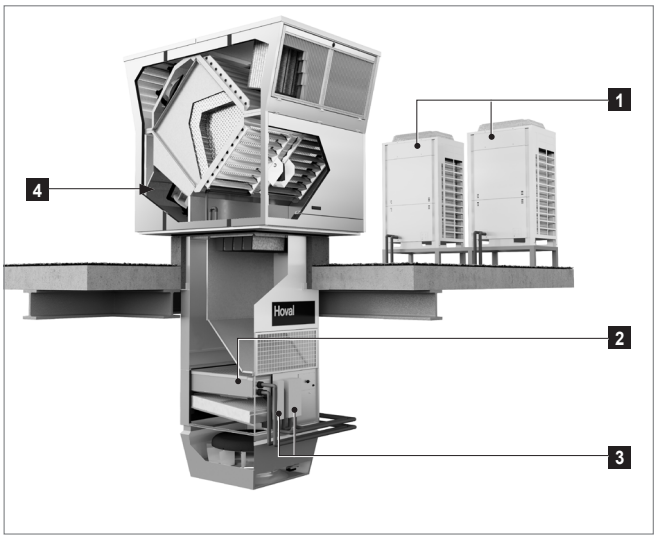
Fig. B1: RoofVent® RP components

2.2 Construction variants



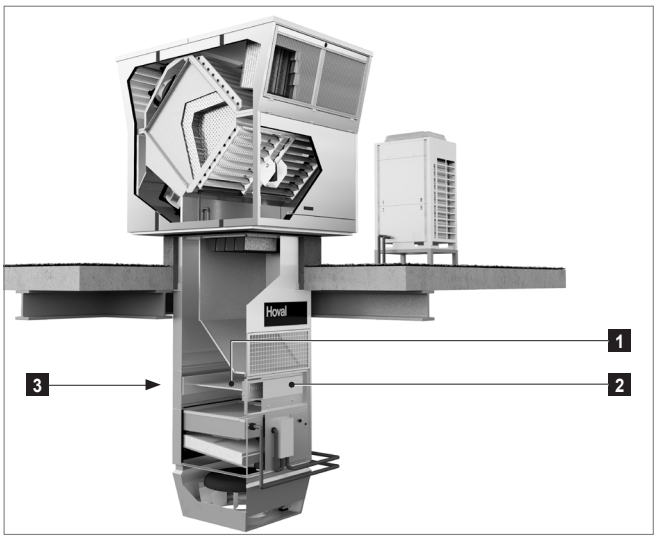
1	Condensate separator
2	Condenser/evaporator
3	Access panel, connection box
4	Extract air filter
5	Supply air fans
6	Supply air access door
7	Communication module
8	Control block
9	Exhaust air access door
10	Exhaust air fans
11	Plate heat exchanger with bypass (for performance control and as recirculation bypass)
12	Fresh air damper with actuator
13	Bypass damper with actuator
14	Fresh air filter
15	Fresh air access door
16	Extract air and recirculation dampers with actuator
17	Condensing unit
18	Extract air access door
19	Extract air grille
20	Access panel, liquid temperature sensor
21	Expansion valve
22	Actuator Air-Injector

Fig. B2: RoofVent® RP with 1 heat pump system



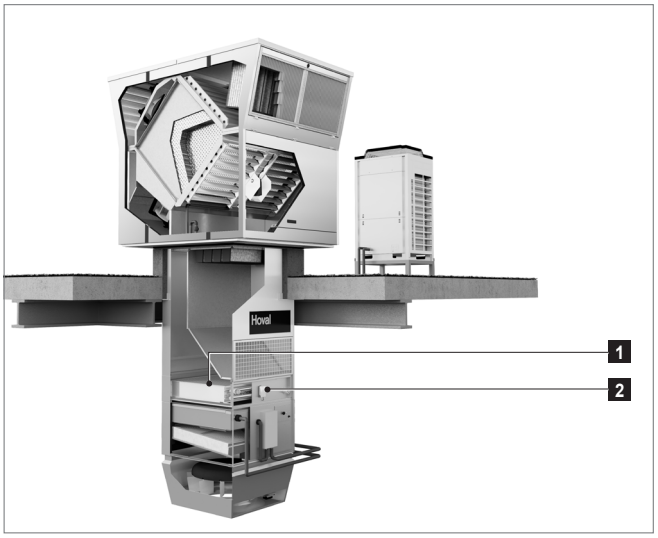
1 2 condensing units
2 Condenser/evaporator with 2 circuits
3 2 expansion valves
4 2 communication modules

Fig. B3: RoofVent® RP with 2 heat pump systems



1 Electric heating coil
2 Access panel, electric heating coil
3 Access panel, electric heating coil connection

Fig. B4:
RoofVent® RP with supplementary heater (electric heating coil)

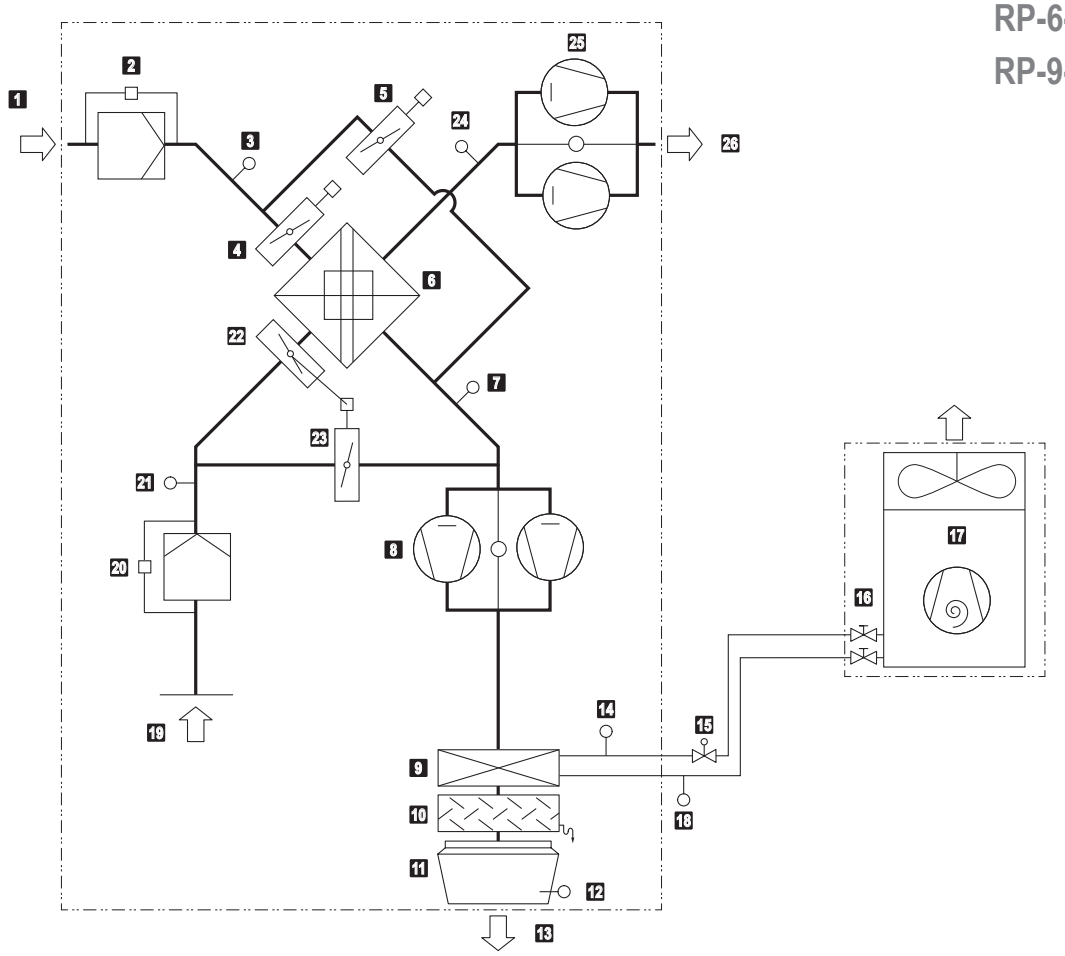


1 Heating coil (hot water)
2 Frost stat

Fig. B5:
RoofVent® RP with supplementary heater (hot water)

2.3 Function diagrams

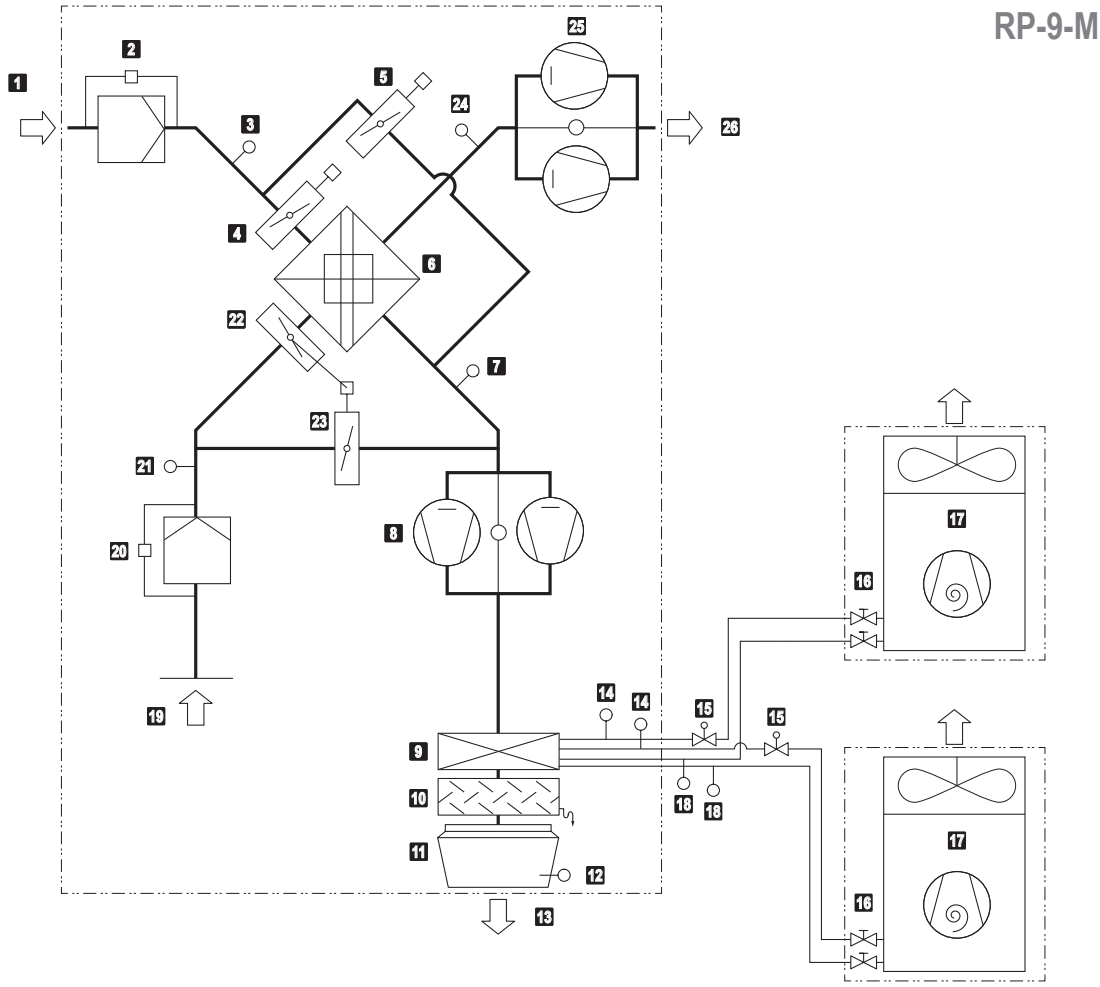
RoofVent® RP with 1 heat pump system



1	Fresh air	14	Liquid temperature sensor
2	Fresh air filter with differential pressure switch	15	Expansion valve (supplied loose)
3	Temperature sensor air inlet ER (optional)	16	Shut-off valves
4	Fresh air damper with actuator	17	Condensing unit
5	Bypass damper with actuator	18	Gas temperature sensor (supplied loose)
6	Plate heat exchanger	19	Extract air
7	Temperature sensor air outlet ER (optional)	20	Extract air filter with differential pressure switch
8	Supply air fans with flow rate monitoring	21	Extract air temperature sensor
9	Heating/cooling coil	22	Extract air damper with actuator
10	Condensate separator	23	Recirculation damper (opposed to the extract air damper)
11	Air-Injector with actuator	24	Exhaust air temperature sensor
12	Supply air temperature sensor	25	Exhaust air fans with flow rate monitoring
13	Supply air	26	Exhaust air

Table B1: RoofVent® RP-6-K, RP-9-K function diagram

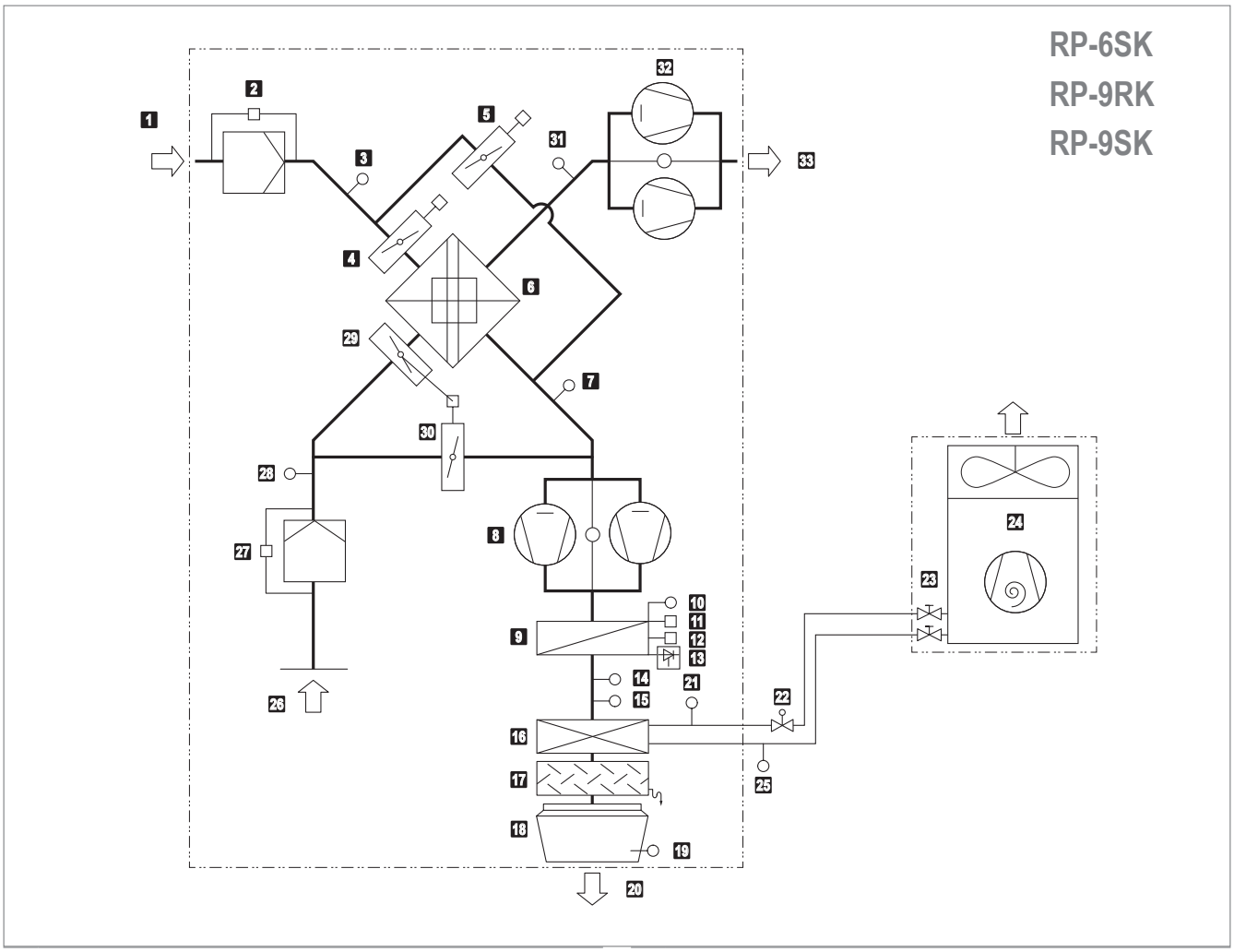
RoofVent® RP with 2 heat pump systems



1	Fresh air	14	Liquid temperature sensor
2	Fresh air filter with differential pressure switch	15	Expansion valve (supplied loose)
3	Temperature sensor air inlet ER (optional)	16	Shut-off valves
4	Fresh air damper with actuator	17	Condensing unit
5	Bypass damper with actuator	18	Gas temperature sensor (supplied loose)
6	Plate heat exchanger	19	Extract air
7	Temperature sensor air outlet ER (optional)	20	Extract air filter with differential pressure switch
8	Supply air fans with flow rate monitoring	21	Extract air temperature sensor
9	Heating/cooling coil	22	Extract air damper with actuator
10	Condensate separator	23	Recirculation damper (opposed to the extract air damper)
11	Air-Injector with actuator	24	Exhaust air temperature sensor
12	Supply air temperature sensor	25	Exhaust air fans with flow rate monitoring
13	Supply air	26	Exhaust air

Table B2: RoofVent® RP-9-M function diagram

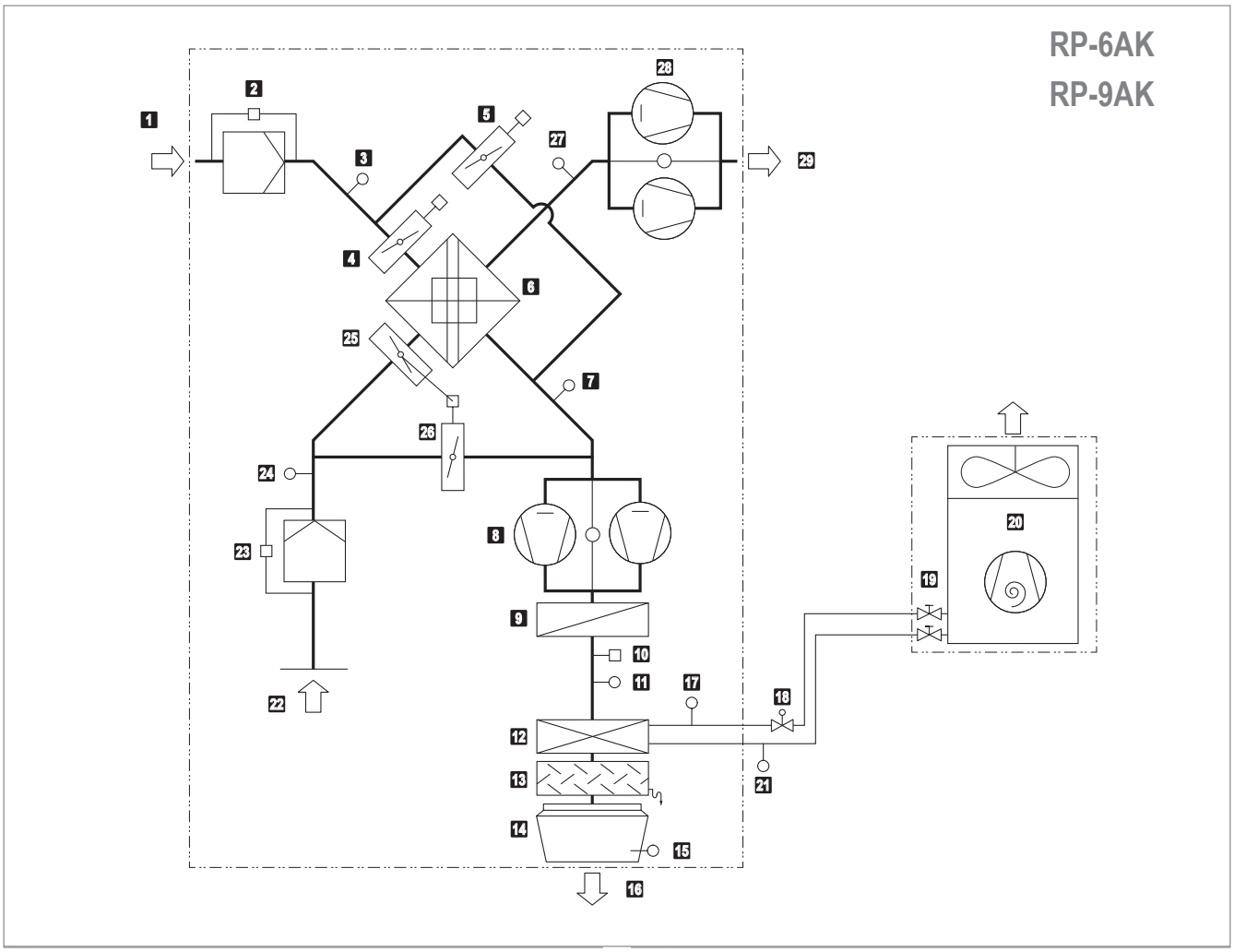
RoofVent® RP with supplementary heater (electric heating coil)



1	Fresh air	18	Air-Injector with actuator
2	Fresh air filter with differential pressure switch	19	Supply air temperature sensor
3	Temperature sensor air inlet ER (optional)	20	Supply air
4	Fresh air damper with actuator	21	Liquid temperature sensor
5	Bypass damper with actuator	22	Expansion valve (supplied loose)
6	Plate heat exchanger	23	Shut-off valves
7	Temperature sensor air outlet ER (optional)	24	Condensing unit
8	Supply air fans with flow rate monitoring	25	Gas temperature sensor (supplied loose)
9	Heating coil (electric)	26	Extract air
10	Run-on thermostat	27	Extract air filter with differential pressure switch
11	Temperature monitor	28	Extract air temperature sensor
12	Safety temperature limiter	29	Extract air damper with actuator
13	Thyristor controller	30	Recirculation damper (opposed to the extract air damper)
14	Temperature sensor air outlet supplementary heater	31	Exhaust air temperature sensor
15	Air flow monitoring	32	Exhaust air fans with flow rate monitoring
16	Heating/cooling coil	33	Exhaust air
17	Condensate separator		

Table B3: RoofVent® RP-6SK, RP-9RK, RP-9SK function diagram

RoofVent® RP with supplementary heater (hot water)



1	Fresh air	16	Supply air
2	Fresh air filter with differential pressure switch	17	Liquid temperature sensor
3	Temperature sensor air inlet ER (optional)	18	Expansion valve (supplied loose)
4	Fresh air damper with actuator	19	Shut-off valves
5	Bypass damper with actuator	20	Condensing unit
6	Plate heat exchanger	21	Gas temperature sensor (supplied loose)
7	Temperature sensor air outlet ER (optional)	22	Extract air
8	Supply air fans with flow rate monitoring	23	Extract air filter with differential pressure switch
9	Heating coil (hot water)	24	Extract air temperature sensor
10	Frost controller	25	Extract air damper with actuator
11	Temperature sensor air outlet supplementary heater	26	Recirculation damper (opposed to the extract air damper)
12	Heating/cooling coil	27	Exhaust air temperature sensor
13	Condensate separator	28	Exhaust air fans with flow rate monitoring
14	Air-Injector with actuator	29	Exhaust air
15	Supply air temperature sensor		

Table B4: RoofVent® RP-6AK, RP-9AK function diagram

2.4 Operating modes

The RoofVent® RP has the following operating modes:

- Ventilation
- Ventilation (reduced)
- Air quality
- Recirculation
- Exhaust air
- Supply air
- Standby

The TopTronic® C control system regulates these operating modes automatically for each control zone in accordance with the specifications in the calendar. The following points also apply:

- The operating mode of a control zone can be switched over manually.
- Each RoofVent® unit can operate individually in a local operating mode: Off, Recirculation, Supply air, Exhaust air, Ventilation, Forced heating.

Code	Operating mode	Description
VE	**Ventilation** The unit blows fresh air into the room and exhausts polluted room air. The room temperature set value day is active. Depending on the temperature conditions, the system continuously controls: ■ the energy recovery ■ the heating/cooling	Supply air fan ..... on *) Exhaust air fan ..... on *) Energy recovery ..... 0-100 % Extract air damper ..... open Recirculation damper ..... closed Heating/cooling ..... 0-100 % *) Adjustable flow rate
VEL	**Ventilation (reduced)** As VE, but the unit only operates with the set minimum values for the supply and exhaust air volumes	Supply air fan ..... MIN Exhaust air fan ..... MIN Energy recovery ..... 0-100 % Extract air damper ..... open Recirculation damper ..... closed Heating/cooling ..... 0-100 %
AQ	**Air quality** This is the operating mode for demand-controlled ventilation of the room. The room temperature set value day is active. Depending on the temperature conditions, the system continuously controls: ■ the energy recovery ■ the heating/cooling Depending on the room air quality, the system operates in one of the following operating states:	
AQ_REC	■ Air quality Recirculation: When air quality is good, the unit heats or cools in recirculation operation.	Like REC
AQ_ECO	■ Air quality Mixed air: When ventilation requirements are medium, the unit heats or cools in mixed air operation. The supply/exhaust air volume is based on the air quality.	Supply air fan ..... MIN-MAX Exhaust air fan ..... MIN-MAX Energy recovery ..... 0-100 % Extract air damper ..... 50 % Recirculation damper ..... 50 % Heating/cooling ..... 0-100 %
AQ_VE	■ Air quality Ventilation: When ventilation requirements are high, the unit heats or cools in pure ventilation operation. The supply/exhaust air volume is based on the air quality.	Supply air fan ..... MIN-MAX Exhaust air fan ..... MIN-MAX Energy recovery ..... 0-100 % Extract air damper ..... open Recirculation damper ..... closed Heating/cooling ..... 0-100 %
REC	**Recirculation** On/Off recirculation operation with TempTronic algorithm: During heat or cool demand, the unit draws in room air, heats or cools it and blows it back into the room. The room temperature set value day is active. The flow rate is controlled in 2 stages.	Supply air fan ..... 0 / 50 / 100 % *) Exhaust air fan ..... off Energy recovery ..... 0 % Extract air damper ..... closed Recirculation damper ..... open Heating/cooling ..... on *) *) Depending on heat or cool demand
DES	■ Destratification: To avoid heat build-up under the ceiling, it may be appropriate to switch on the fan when there is no heat or cool demand (either in permanent operation or in on/off operation depending on the temperature stratification).	

Code	Operating mode	Description
EA	**Exhaust air** The unit extracts spent room air. There is no room temperature control. Unfiltered fresh air enters the room through open windows and doors or another system provides air supply.	Supply air fan ..... off Exhaust air fan ..... on *) Energy recovery ..... 0 % Extract air damper ..... open Recirculation damper ..... closed Heating/cooling ..... off *) Adjustable flow rate
SA	**Supply air** The unit blows fresh air into the room. The room temperature set value day is active. Depending on the temperature conditions, the system controls the heating/cooling. Spent room air passes through open windows and doors or another system provides extraction.	Supply air fan ..... on *) Exhaust air fan ..... off Energy recovery ..... 0 % **) Extract air damper ..... open Recirculation damper ..... closed Heating/cooling ..... 0-100 % *) Adjustable flow rate **) Fresh air and bypass dampers are open
ST	**Standby** The unit is normally switched off. The following functions remain active:	
CPR	■ Cooling protection: If the room temperature drops below the set value for cooling protection, the unit heats up the room in recirculation operation.	Supply air fan ..... MAX Exhaust air fan ..... off Energy recovery ..... 0 % Extract air damper ..... closed Recirculation damper ..... open Heating/cooling ..... on
OPR	■ Overheating protection: If the room temperature rises above the set value for overheating protection, the unit cools down the room in recirculation operation. If the temperatures also permit fresh air cooling, the units automatically switches to night cooling (NCS) to save energy.	
NCS	■ Night cooling: If the room temperature exceeds the set value for night cooling and the current fresh air temperature permits it, the unit blows cool fresh air into the room and extracts warmer room air.	Supply air fan ..... on *) Exhaust air fan ..... on *) Energy recovery ..... 0 % Extract air damper ..... open Recirculation damper ..... closed Heating/cooling ..... off *) Adjustable flow rate
L_OFF	**Off** (local operating mode) The unit is switched off. Frost protection remains active.	Supply air fan ..... off Exhaust air fan ..... off Energy recovery ..... 0 % Extract air damper ..... closed Recirculation damper ..... open Heating/cooling ..... off
–	**Forced heating (only for units with supplementary heater)** The unit draws in room air, warms it and blows it back into the room. Forced heating is activated by inserting a wire jumper in the control block. For example, it is suitable for heating the hall before taking the control system into operation or if the controller fails during the heating period. Connecting a room thermostat makes it possible to specify a room temperature set value.	Supply air fan ..... MAX Exhaust air fan ..... off Energy recovery ..... 0 % Extract air damper ..... closed Recirculation damper ..... open Heating ..... on

Table B5: RoofVent® RP operating modes

3 Technical data

3.1 Type code

RP - 6 A K ...

Unit type
RoofVent® RP

Unit size
6 or 9

Heating section (option)
- - without heating section
- A with coil type A (hot water)
- R with coil type R (electric)
- S with coil type S (electric)

Heating/cooling section
- K with coil type K (1 heat pump)
- M with coil type M (2 heat pumps)

Further options

Table B6: Type code

3.2 Application limits

Fresh air temperature heating mode		min. max.	°C °C	-20 15
Fresh air temperature cooling mode		min. max.	°C °C	-5 40
Extract air temperature		max.	°C	50
Extract air relative humidity [1]		max.	%	60
Moisture content of extract air [1]		max.	g/kg	12.5
Supply air temperature		max.	°C	45
Air flow rate	Size 6: Size 9:	min. min.	m³/h m³/h	3100 5000
Condensate quantity	Size 6: Size 9:	max. max.	kg/h kg/h	90 150
Temperature of the heating medium [2]		max.	°C	90
Pressure of the heating medium [2]		max.	kPa	800

The units cannot be used in:
- Damp locations
- Rooms with mineral oil vapours in the air
- Rooms with a high salt content in the air
- Rooms with acidic or alkaline vapours in the air

[1] Units for applications where the humidity in the room increases by more than 2 g/kg are available on request.
[2] For units with supplementary hot water heater

Table B7: Application limits

3.3 Heat recovery system (HRS)

Unit type		RP-6	RP-9
Temperature efficiency, dry	%	77	78
Temperature efficiency, wet	%	89	90

Table B8: Thermal transfer level of the plate heat exchanger

3.4 Air filtration

Filter	Fresh air	Extract air
Class acc. to ISO 16890	ePM_1 55 %	ePM_{10} 65 %
Class acc. to EN 779	F7	M5
Factory setting of differential pressure switches	250 Pa	350 Pa

Table B9: Air filtration

3.5 Electrical connection

RoofVent® RP

Unit type		RP-6...K	RP-9...K RP-9-M
Supply voltage	V AC	3 × 400	3 × 400
Permitted voltage tolerance	%	± 5	± 5
Frequency	Hz	50	50
Connected load	kW	4.5	8.5
Current consumption max.	A	7.7	14.3
Series fuse	A	13.0	20.0

Table B10: RoofVent® RP electrical connections

Electric heating coil		6S	9R	9S
Connected load	kW	14	14	28
Current consumption max.	A	20	20	40
Series fuse	A	20	20	40

Table B11: Electric heating coil electrical connections

ERQ250 condensing unit

Unit type		RP...6-K RP...9-K	RP-9-M
Supply voltage	V AC	3 × 400	3 × 400
Permitted voltage tolerance	%	± 10	± 10
Frequency	Hz	50	50
Connected load	kW	13.5	2 × 13.5
Current consumption max.	A	21.6	2 × 21.6
Series fuse	A	25	2 × 25.0
Inrush current	A	74	2 × 74.0

Table B12: Daikin ERQ250 condensing unit electrical connections

3.6 Flow rate, product parameters

Unit type			RP-6			RP-9				
Nominal air flow rate		m³/h	5500			8000				
		m³/s	1.53			2.22				
Floor area covered		m²	480			797				
Specific fan power SFP_{int}		W/(m³/s)	920			940				
Face velocity		m/s	2.69			2.98				
Static efficiency of the fans		%	62			63				
Internal pressure drop of ventilation components										
	Fresh air/supply air	Pa	270			268				
	Extract air/exhaust air	Pa	300			316				
Maximum leakage rate										
	External	%	0.45			0.25				
	Internal	%	1.5			1.2				
Heating/cooling section			**6-K**	**6AK**	**6SK**	**9-K**	**9-M**	**9AK**	**9RK**	**9SK**
Nominal external pressure										
	Supply air	Pa	130	110	130	240	200	210	230	220
	Extract air	Pa	190	190	190	300	300	300	300	300
Effective electric power input		kW	2.13	2.18	2.14	3.31	3.42	3.45	3.34	3.38

Table B13: RoofVent® RP technical data

3.7 Condensing unit technical data

Rated heat output [1]	kW	31.5
Rated cooling capacity [2]	kW	28.0
COP value	–	4.09
EER value	–	3.77
Condensation temperature	°C	46
Evaporation temperature	°C	6
Working medium	–	R410a
Fill volume working medium (prefilled)	kg	8.4

1) With fresh air temperature 7 °C / extract air temperature 20 °C
2) With fresh air temperature 35 °C / extract air temperature 27 °C / 45% rel. humidity

Table B14: Daikin ERQ250 condensing unit technical data

3.8 Heat output

t_F	Type	Q	Q_{TG}	H_{max}	t_S	P_{HP}	P_E	Δp_W	m_W
°C	RP-	kW	kW	m	°C	kW	kW	kPa	l/h
-5	6–K	27.5	20.6	15.7	29.1	8.20	–	–	–
	6AK	41.7	34.8	12.3	36.8	9.14	–	1.0	413.0
	6SK	41.3	34.4	12.3	36.6	9.14	14.0	–	–
	9–K	27.5	18.1	20.5	24.7	8.50	–	–	–
	9–M	55.0	45.6	13.3	34.9	17.00	–	–	–
	9AK	52.4	43.0	13.6	34.0	9.36	–	1.0	722.0
	9RK	41.4	32.0	15.6	29.9	8.93	14.0	–	–
	9SK	52.8	43.4	13.6	34.1	9.36	25.6	–	–
-15	6–K	22.1	11.6	20.5	24.2	7.50	–	–	–
	6AK	37.5	26.9	13.8	32.5	8.18	–	1.0	446.0
	6SK	35.9	25.4	14.2	31.7	8.04	14.0	–	–
	9–K	22.1	7.7	25.0	20.9	7.50	–	–	–
	9–M	44.2	29.8	16.2	29.1	15.00	–	–	–
	9AK	48.7	34.3	15.1	30.7	8.45	–	1.0	769.0
	9RK	36.0	21.6	18.8	26.0	7.77	14.0	–	–
	9SK	49.9	35.5	14.9	31.2	8.45	28.0	–	–

Legend:
- t_F = Fresh air temperature
- Q = Heat output
- Q_{TG} = Output to cover fabric heat losses
- H_{max} = Maximum mounting height
- t_S = Supply air temperature
- P_{HP} = Power consumption of the condensing unit(s)
- P_E = Power consumption of the electric heating coil
- Δp_W = Water pressure drop
- m_W = Water quantity

Reference: Room air 18 °C, extract air 20 °C / 20 % rel. humidity
Supplementary heater with hot water: Flow/Return 60°C/30°C

Table B15: RoofVent® RP heat output

Notice
The output for coverage of the fabric heat losses (Q_{TG}) allows for the ventilation heat requirement (Q_V) and the energy recovery output (Q_{ER}) under the respective air conditions. The following applies:
$Q + Q_{ER} = Q_V + Q_{TG}$

3.9 Cooling capacities

t_F	RH_F	Type	Q_{sen}	Q_{tot}	Q_{TG}	t_S	m_C	P_{HP}
°C	%	RP-	kW	kW	kW	°C	kg/h	kW
28	40	6...K	16.5	23.0	11.6	16.0	9.6	4.70
		9...K	18.1	25.6	10.3	18.2	11.1	5.24
		9–M	30.8	42.2	23.1	13.4	16.7	8.62
	60	6...K	13.6	26.7	8.2	17.6	19.3	5.79
		9...K	14.6	29.3	7.7	19.4	21.5	6.35
		9–M	25.4	49.8	17.6	15.5	36.0	10.79
32	40	6...K	18.6	28.6	13.2	18.9	14.8	6.91
		9...K	18.3	28.6	10.6	22.1	15.1	6.91
		9–M	35.7	54.1	28.0	15.6	27.0	13.06
	60	6...K	12.4	29.7	7.0	22.2	25.3	6.97
		9...K	12.3	29.7	4.6	24.3	25.5	6.97
		9–M	25.6	59.4	17.8	19.4	49.7	13.96

Legend:
- t_F = Fresh air temperature
- RH_F = Relative humidity of the fresh air
- Q_{sen} = Sensible cooling capacity
- Q_{tot} = Total cooling capacity
- Q_{TG} = Output for coverage of transmission sensible gains (→ sensible cooling load)
- t_S = Supply air temperature
- m_C = Condensate quantity
- P_{HP} = Power consumption of the condensing unit(s)

Reference:
- At fresh air temperature 28 °C: room air 22 °C, extract air 24 °C / 50 % rel. humidity
- At fresh air temperature 32 °C: room air 26 °C, extract air 28 °C / 50 % rel. humidity

Table B16: RoofVent® RP cooling capacity

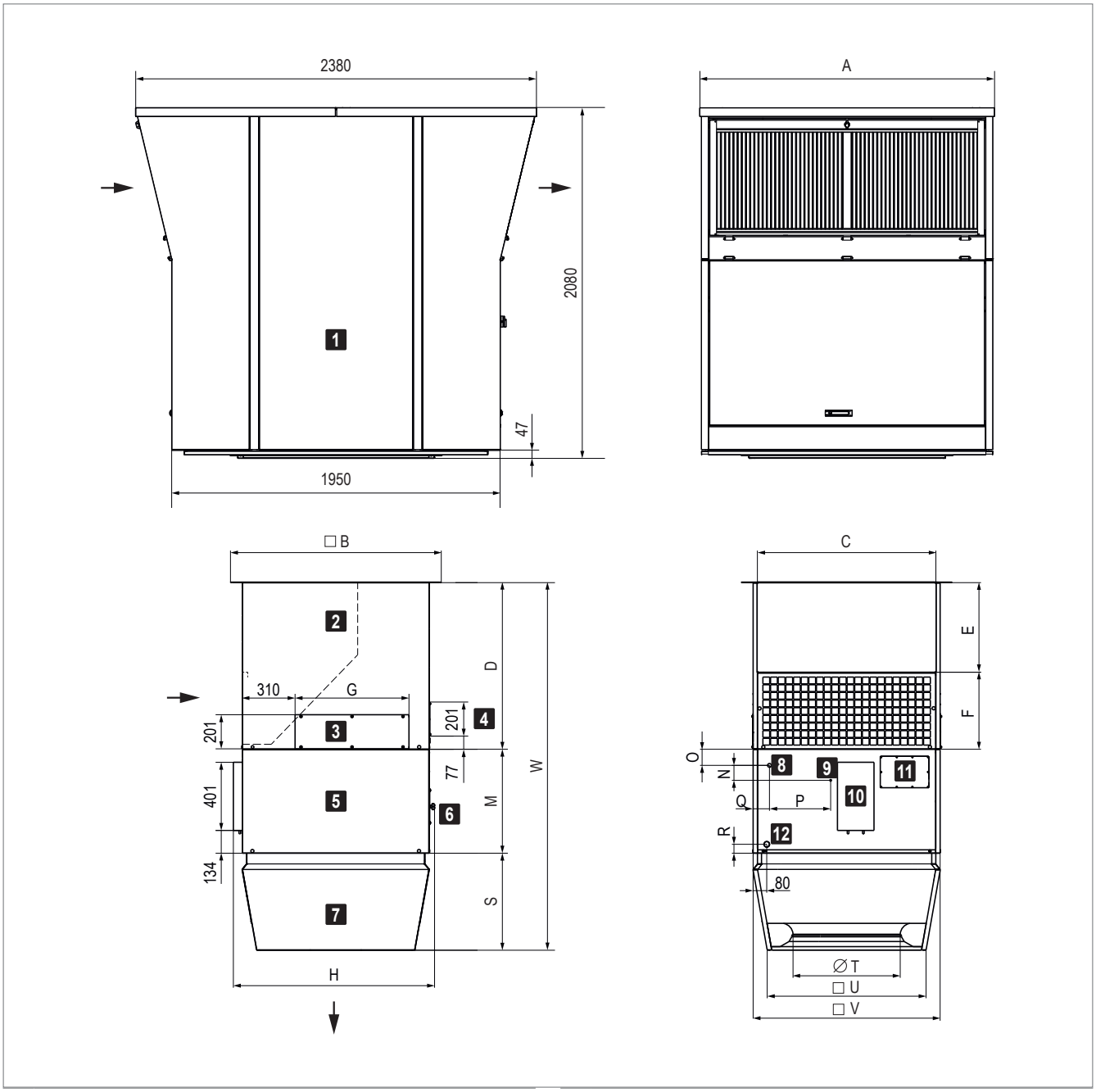
Notice

The output for coverage of transmission sensible gains (Q_{TG}) allows for the ventilation cooling requirement (Q_V) and the output of the energy recovery (Q_{ER}) under the respective air conditions. The following applies:

$$Q_{sen} + Q_{ER} = Q_V + Q_{TG}$$

3.10 Dimensions and weights

RoofVent® RP with 1 heat pump system



1	Roof unit with energy recovery	7	Air-Injector
2	Connection module	8	Gas line connection (∅ 22.2 mm)
3	Access panel, coil	9	Liquid line connection (∅ 9.5 mm)
4	Access panel, connection box	10	Expansion valve
5	Heating/cooling section	11	Access panel, liquid temperature sensor
6	Access panel, condensate separator	12	Condensate connection (G1" external)

Fig. B6: RoofVent® RP-6-K, RP-9-K dimensional drawing (dimensions in mm)

Unit type		RP-6				RP-9			
A	mm	1400				1750			
B	mm	1040				1240			
C	mm	848				1048			
F	mm	410				450			
G	mm	470				670			
M	mm	620				610			
S	mm	490				570			
T	mm	500				630			
U	mm	767				937			
V	mm	900				1100			
H	mm	984				1184			
Connection module		**V0**	**V1**	**V2**	**V3**	**V0**	**V1**	**V2**	**V3**
D	mm	940	1190	1440	1940	980	1230	1480	1980
E	mm	530	780	1030	1530	530	780	1030	1530
W	mm	2050	2300	2550	3050	2160	2410	2660	3160

Table B17: RoofVent® RP dimensions

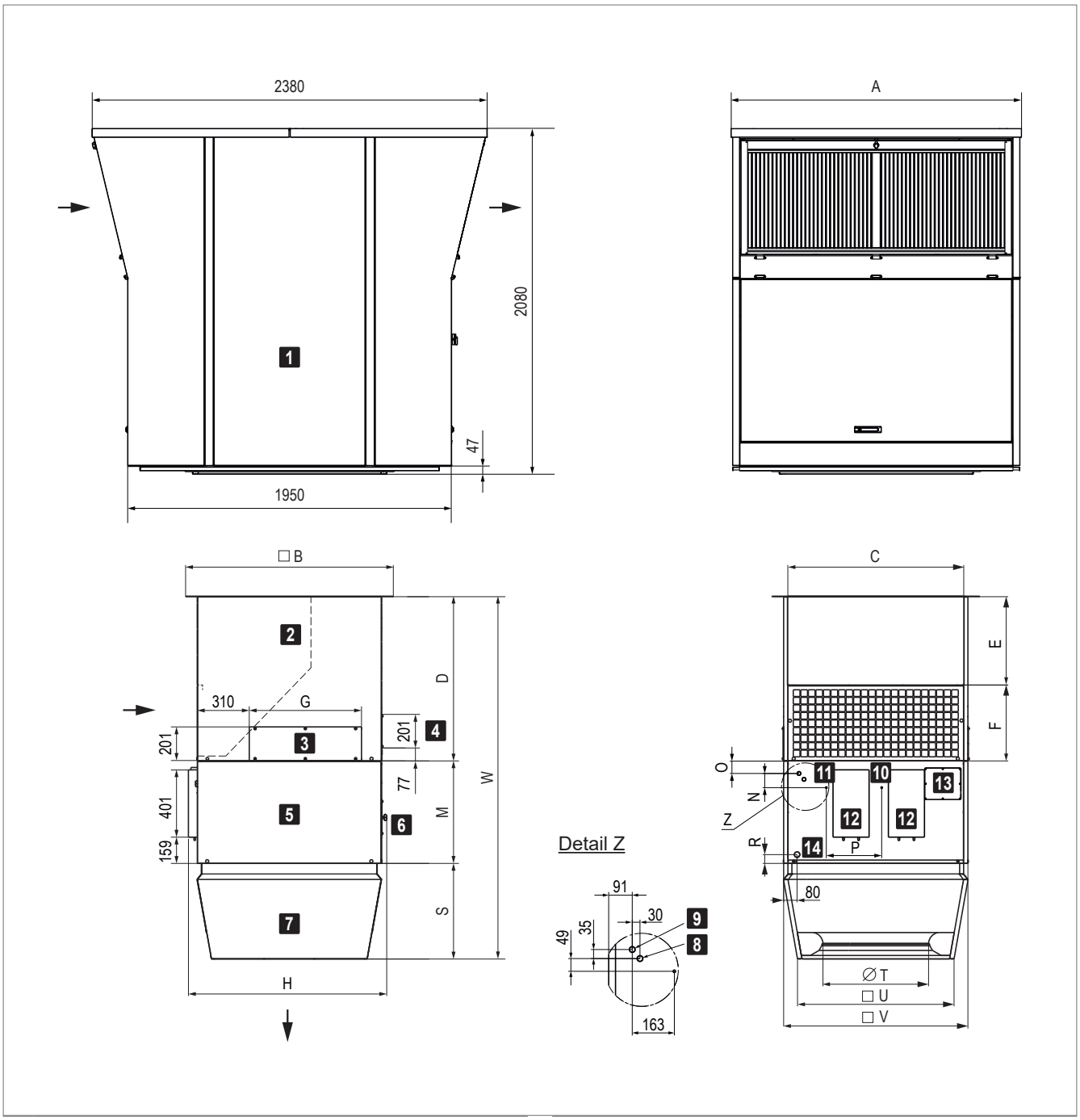
Unit type		RP-6-K	RP-9-K
N	mm	68	88
O	mm	123	95
P	mm	254	360
Q	mm	71	96
R	mm	54	53

Table B18: Dimensions for connection

Unit type		RP-6-K	RP-9-K
Total	**kg**	**889**	**1151**
Roof unit	kg	704	904
Below-roof unit	kg	185	247
Air-Injector	kg	37	56
Heating/cooling section	kg	70	94
Expansion valve	kg	3	3
Connection module V0	kg	75	94
Additional weight V1	kg	+ 11	+ 13
Additional weight V2	kg	+ 22	+ 26
Additional weight V3	kg	+ 44	+ 52

Table B19: RoofVent® RP weights

RoofVent® RP with 2 heat pump systems



1	Roof unit with energy recovery	8	Gas line connection – circuit 1 (∅ 22.2 mm)
2	Connection module	9	Gas line connection – circuit 2 (∅ 22.2 mm)
3	Access panel, coil	10	Liquid line connection – circuit 1 (∅ 9.5 mm)
4	Access panel, connection box	11	Liquid line connection – circuit 2 (∅ 9.5 mm)
5	Heating/cooling section	12	Expansion valve
6	Access panel, condensate separator	13	Access panel, liquid temperature sensor
7	Air-Injector	14	Condensate connection (G1" external)

Fig. B7: RoofVent® RP-9-M dimensional drawing (dimensions in mm)

Unit type		RP-9			
A	mm	1750			
B	mm	1240			
C	mm	1048			
F	mm	450			
G	mm	670			
M	mm	610			
S	mm	570			
T	mm	630			
U	mm	937			
V	mm	1100			
H	mm	1184			
Connection module		**V0**	**V1**	**V2**	**V3**
D	mm	980	1230	1480	1980
E	mm	530	780	1030	1530
W	mm	2160	2410	2660	3160

Table B20: RoofVent® RP dimensions

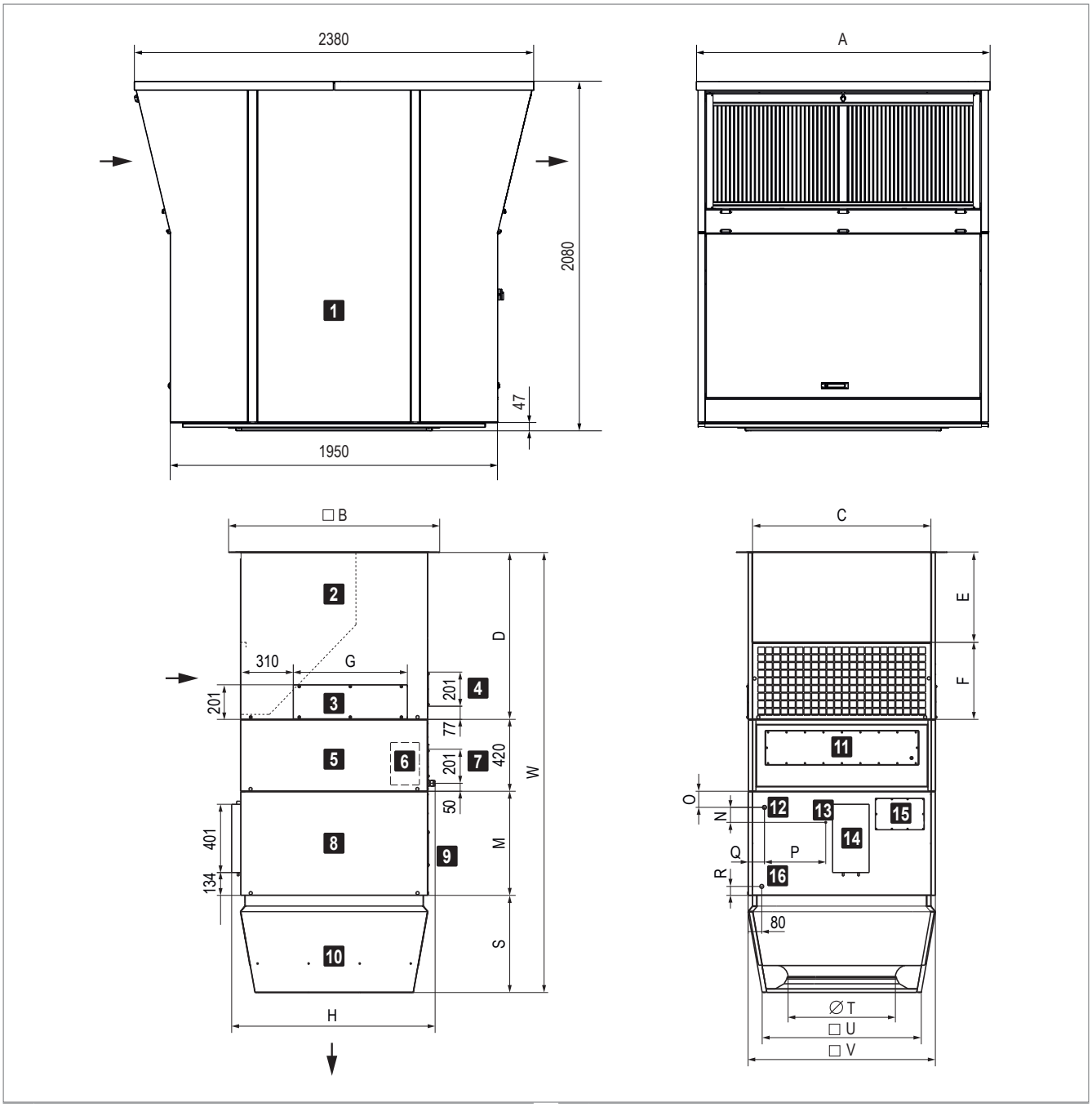
Unit type		RP-9-M
N	mm	84
O	mm	73
P	mm	330
R	mm	53

Table B21: Dimensions for connection

Unit type		RP-9-M
Total	**kg**	**1174**
Roof unit	kg	908
Below-roof unit	kg	266
Air-Injector	kg	56
Heating/cooling section	kg	110
Expansion valve	kg	6
Connection module V0	kg	94
Additional weight V1	kg	+ 13
Additional weight V2	kg	+ 26
Additional weight V3	kg	+ 52

Table B22: RoofVent® RP weights

RoofVent® RP with supplementary heater (electric heating coil)



1	Roof unit with energy recovery	9	Access panel, condensate separator
2	Connection module	10	Air-Injector
3	Access panel, coil	11	Access panel, electric heating coil
4	Access panel, connection box	12	Gas line connection (∅ 22.2 mm)
5	Heating section (electric)	13	Liquid line connection (∅ 9.5 mm)
6	Access panel, thyristor controller	14	Expansion valve
7	Access panel, electric heating coil connection	15	Access panel, liquid temperature sensor
8	Heating/cooling section	16	Condensate connection (G1" external)

Fig. B8: RoofVent® RP-6SK, RP-9RK, RP-9SK dimensional drawing (dimensions in mm)

Unit type		RP-6SK				RP-9RK, RP-9SK			
A	mm	1400				1750			
B	mm	1040				1240			
C	mm	848				1048			
F	mm	410				450			
G	mm	470				670			
M	mm	620				610			
S	mm	490				570			
T	mm	500				630			
U	mm	767				937			
V	mm	900				1100			
H	mm	993				1192			
Connection module		**V0**	**V1**	**V2**	**V3**	**V0**	**V1**	**V2**	**V3**
D	mm	940	1190	1440	1940	980	1230	1480	1980
E	mm	530	780	1030	1530	530	780	1030	1530
W	mm	2470	2720	2970	3470	2580	2830	3080	3580

Table B23: RoofVent® RP dimensions

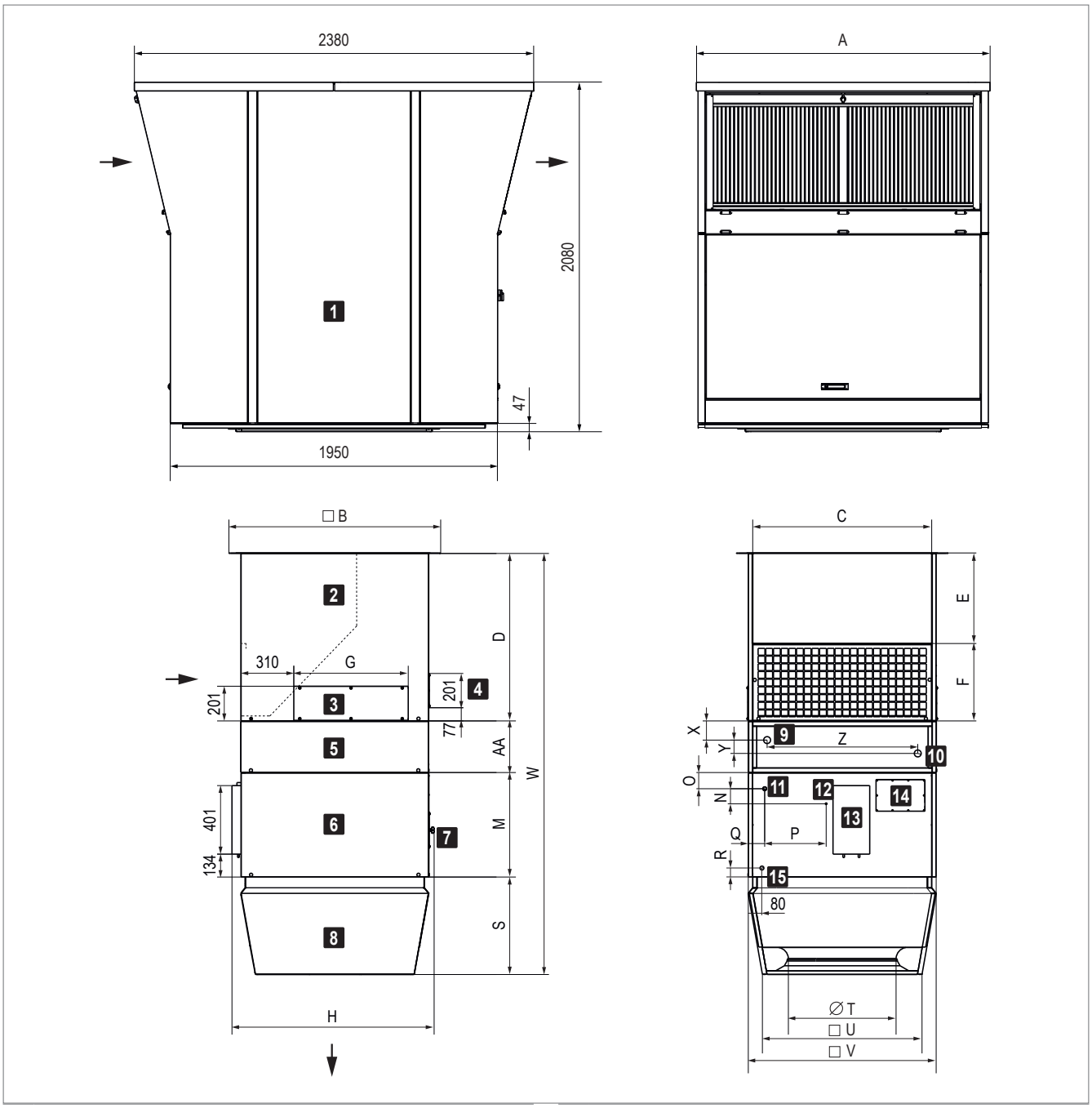
Unit type		RP-6SK	RP-9RK	RP-9SK
N	mm	68	88	88
O	mm	123	95	95
P	mm	254	360	360
Q	mm	71	96	96
R	mm	54	53	53

Table B24: Dimensions for connection

Unit type		RP-6SK	RP-9RK	RP-9SK
Total	**kg**	**938**	**1212**	**1220**
Roof unit	kg	704	904	904
Below-roof unit	kg	234	308	316
Air-Injector	kg	37	56	56
Heating section	kg	49	61	69
Heating/cooling section	kg	70	94	94
Expansion valve	kg	3	3	3
Connection module V0	kg	75	94	94
Additional weight V1	kg	+ 11	+ 13	+ 13
Additional weight V2	kg	+ 22	+ 26	+ 26
Additional weight V3	kg	+ 44	+ 52	+ 52

Table B25: RoofVent® RP weights

RoofVent® RP with supplementary heater (hot water)



1	Roof unit with energy recovery	9	Return
2	Connection module	10	Flow
3	Access panel, coil	11	Gas line connection (∅ 22.2 mm)
4	Access panel, connection box	12	Liquid line connection (∅ 9.5 mm)
5	Heating section (hot water)	13	Expansion valve
6	Heating/cooling section	14	Access panel, liquid temperature sensor
7	Access panel, condensate separator	15	Condensate connection (G1" external)
8	Air-Injector		

Fig. B9: RoofVent® RP-6AK, RP-9AK dimensional drawing (dimensions in mm)

Unit type		RP-6AK				RP-9AK			
A	mm	1400				1750			
B	mm	1040				1240			
C	mm	848				1048			
F	mm	410				450			
G	mm	470				670			
M	mm	620				610			
S	mm	490				570			
T	mm	500				630			
U	mm	767				937			
V	mm	900				1100			
H	mm	984				1184			
X	mm	101				111			
Y	mm	78				78			
Z	mm	758				882			
AA	mm	270				300			
Connection module		**V0**	**V1**	**V2**	**V3**	**V0**	**V1**	**V2**	**V3**
D	mm	940	1190	1440	1940	980	1230	1480	1980
E	mm	530	780	1030	1530	530	780	1030	1530
W	mm	2320	2570	2820	3320	2460	2710	2960	3460

Table B26: RoofVent® RP dimensions

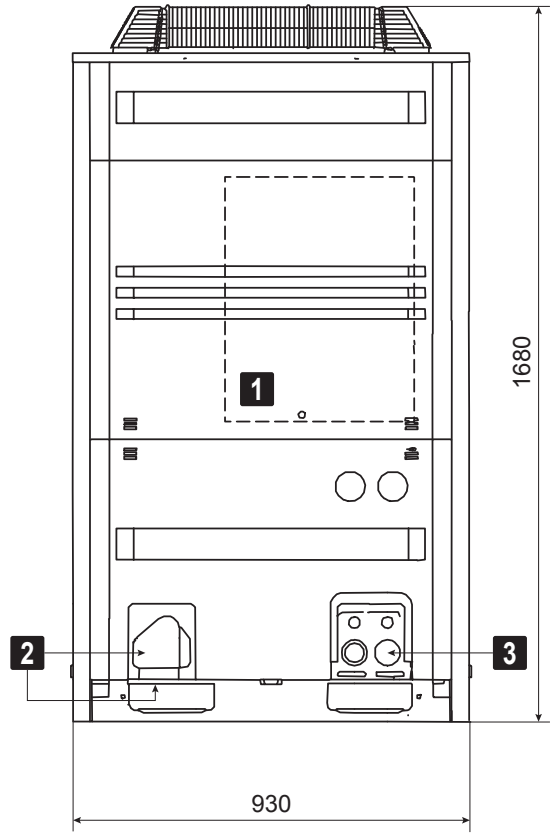
Unit type		RP-6AK	RP-9AK
N	mm	68	88
O	mm	123	95
P	mm	254	360
Q	mm	71	96
R	mm	54	53
Hot water heating coil			
Connection	"	Rp 1½ internal	Rp 1½ internal
Water capacity	l	4.6	7.4

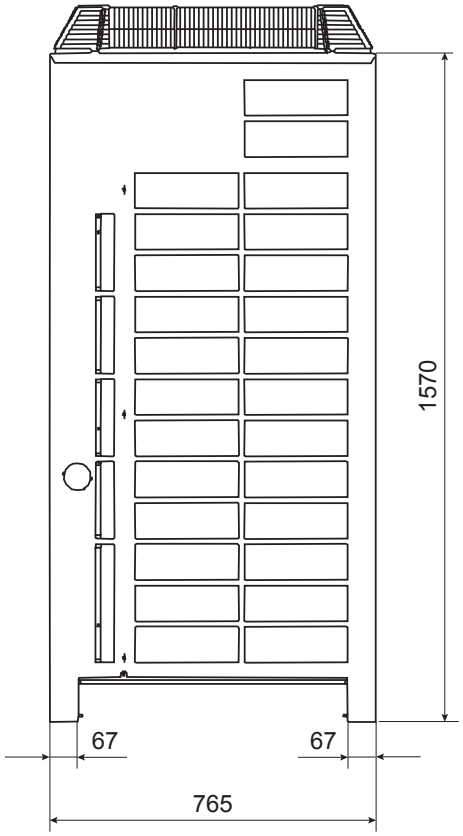
Table B27: Dimensions for connection

Unit type		RP-6AK	RP-9AK
Total	**kg**	**919**	**1195**
Roof unit	kg	704	904
Below-roof unit	kg	215	291
Air-Injector	kg	37	56
Heating section	kg	30	44
Heating/cooling section	kg	70	94
Expansion valve	kg	3	3
Connection module V0	kg	75	94
Additional weight V1	kg	+ 11	+ 13
Additional weight V2	kg	+ 22	+ 26
Additional weight V3	kg	+ 44	+ 52

Table B28: RoofVent® RP weights

Condensing unit



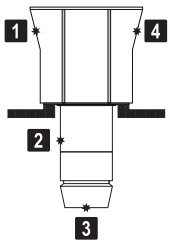


1 Electrical connection box	**Unit type**		**ERQ250**
2 Working medium circuit connection (front or bottom)	Weight	kg	240
3 Cable feedthroughs			

Table B29: Dimensions and weights of the Daikin ERQ250 condensing unit

Position				1	2	3	4
RP-6	Sound pressure level (at a distance of 5 m) 1)		dB(A)	44	44	51	56
	Total sound power level		dB(A)	66	66	73	78
	Octave sound power level	63 Hz	dB	43	43	44	46
		125 Hz	dB	54	54	59	61
		250 Hz	dB	60	60	64	67
		500 Hz	dB	62	62	67	71
		1000 Hz	dB	57	57	70	74
		2000 Hz	dB	55	55	65	70
		4000 Hz	dB	51	51	60	66
		8000 Hz	dB	49	49	58	64
RP-9	Sound pressure level (at a distance of 5 m) 1)		dB(A)	42	42	51	55
	Total sound power level		dB(A)	64	64	73	77
	Octave sound power level	63 Hz	dB	43	42	44	48
		125 Hz	dB	54	54	60	65
		250 Hz	dB	57	57	63	69
		500 Hz	dB	60	59	67	73
		1000 Hz	dB	56	56	69	76
		2000 Hz	dB	55	55	66	74
		4000 Hz	dB	49	48	58	67
		8000 Hz	dB	42	42	53	62

1) With hemispherical radiation in a low-reflection environment



1 Fresh air
2 Extract air
3 Supply air
4 Exhaust air

Table B30: RoofVent® RP sound data

Condensing unit ERQ250	Sound pressure level (at a distance of 5 m) 1)		dB(A)	58
	Total sound power level 2)		dB(A)	78
	Octave sound power level	63 Hz	dB	79
		125 Hz	dB	84
		250 Hz	dB	80
		500 Hz	dB	77
		1000 Hz	dB	73
		2000 Hz	dB	66
		4000 Hz	dB	60
		8000 Hz	dB	53

1) With hemispherical radiation in a low-reflection environment
2) The values given are maximum values; the noise level is fluctuating due to scroll technology.

Table B31: Daikin ERQ250 condensing unit sound data

Notice
The values are increased by 3 dB for 2 condensing units.

4 Specification texts

4.1 RoofVent® RP

Supply and extract air handling unit with reversible heat pump system for heating and cooling high halls.
The unit consists of the following components:
- Roof unit with energy recovery
- Below-roof unit:
  - Connection module
  - Supplementary heater (option)
  - Heating/cooling section
  - Air-Injector
- Control components
- Optional components

The heat pump system consists of the following components:
- Reversible condensing unit (1 or 2 pc.)
- Communication module
- Expansion valve
- Optional components

The RoofVent® RP unit complies with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of ventilation systems. It is a system of the 'non-residential ventilation unit' (NRVU) and 'bidirectional ventilation unit' (BVU) type.

Roof unit with energy recovery

Self-supporting housing, made of aluminium (outside) and aluzinc sheet and aluminium (inside):
- Weatherproof, corrosion resistant, impact resistant, air-tight
- Low flammability, double-shelled, without heat bridges, with highly efficient insulation made of expanded polystyrene
- Hygienic and easy to maintain because of smooth interior surfaces and large access doors with ageing-resistant, silicone-free sealing materials

The roof unit with energy recovery includes:

Supply air and exhaust air fans
Designed as maintenance-free, direct-drive radial fans with high-efficiency EC motor, backwards-curved, 3D contoured blades and a free-running rotating wheel made of a high-performance composite material; inflow nozzle with optimised flow; infinitely variable speed; with active pressure registration for constant volumetric flow control and/or demand-controlled volumetric flow adjustment; low-noise; with integrated overload protection.

Fresh air filter
Designed as highly efficient compact filter elements, ISO ePM_1 55 % (F7), fully incinerable, easy to change, including differential pressure switch for filter monitoring.

Extract air filter
Designed as highly efficient compact filter elements, ISO ePM_{10} 65 % (M5), fully incinerable, easy to change, including differential pressure switch for filter monitoring.

Plate heat exchanger
Crossflow plate heat exchanger made of high-quality aluminium as a highly efficient, recuperative heat recovery system, certified by Eurovent, zero-maintenance, without moving parts, failsafe, hygienically harmless, no cross-contamination of impurities and odours. Equipped with bypass, recirculation bypass, condensate drain and condensation trap to the roof. The following dampers are arranged on the exchanger package:
- Fresh air and bypass dampers, each with their own actuator, for infinitely variable control of the heat recovery; with shut-off function by spring return.
- Extract air and recirculation dampers, interlinked in a counter-rotating arrangement with a common actuator, for controlling the recirculation and mixed air operation; with shut-off function by spring return.

All dampers correspond to seal integrity class 2 according to EN 1751.

Access openings
- Fresh air access door: large access opening with integrated weather and bird protection, configured with quick locking system for easy access to the fresh air filter, the plate heat exchanger as well as the fresh air and bypass dampers.
- Exhaust air access door: large, lockable access opening with integrated weather and bird protection for easy access to the exhaust air filter.
- Extract air access door: large access opening, configured with quick locking system and telescopic support for easy access to the extract air filter, the plate heat exchanger, the condensation trap as well as the extract air and recirculation dampers.
- Supply air access door: large, lockable access opening, configured with telescopic support for easy access to the supply air fans, the control block, the communication module and the condensate collecting channel.

Control block
Compact design on an easily accessible mounting plate, comprising:
- Unit controller as part of the TopTronic® C control system:
  - Fully wired to the electrical components of the roof unit (fans, actuators, temperature sensors, filter monitoring, differential pressure sensor, communication module)
  - Pluggable wiring to the control box in the connection module

- High-voltage section:
  - Mains power terminals
  - Isolation switch
  - Button for stopping the fans during filter change
- Low-voltage section:
  - Transformer for actuators, sensors and the unit controller
- Circuit board with further electronic components for unit control (differential pressure measurement, control of heat pump system, fuses for the transformer, fuses for low voltage, ...)

Connection module

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of smooth interior surfaces and ageing-resistant, silicone-free sealing materials; configured with extract air grille and access panel for easy access to the coil for maintenance. The connection module contains:

- Laced wiring harness protected in a sheet metal duct, with direct plug connection to the control block in the roof unit
- Connection box made of galvanised sheet steel, configured with screw-on cover and cable lead-ins with splash water protection and strain relief; for connection of:
  - Power supply
  - Zone bus
  - Heat pump system
  - All sensors and actuators of the below-roof unit
  - Optional components as required

Connection module V1 / V2 / V3:

The connection module is extended for adapting to the local installation situation.

Heating/cooling section

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of smooth internal surfaces and ageing-resistant, silicone-free sealing materials, internally insulated with close-pored polyurethane. The heating/cooling section contains:

- The highly efficient condenser/evaporator consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins, manifold made of copper and injection distributor
- The pull-out condensate separator with collecting channel, made of high-quality corrosion-resistant material, with a downslope in all directions for rapid draining
- The condensate trap for connecting to a condensate drain (supplied).

Air-Injector

1 Air-Injectors

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored polyethylene, with:

- Vortex air distributor with concentric outlet nozzle, adjustable vanes and integrated absorber hood
- Actuator for infinitely variable adjustment of the air distribution from vertical to horizontal for draught-free air distribution in the hall under changing operating conditions
- Supply air temperature sensor

2 Air-Injectors

2x Air-Injectors, supplied loose; supply air duct for connecting the RoofVent® unit to the Air-Injectors on site. Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored polyethylene, with:

- Vortex air distributor with concentric outlet nozzle, adjustable vanes and integrated absorber hood
- Actuator for infinitely variable adjustment of the air distribution from vertical to horizontal for draught-free air distribution in the hall under changing operating conditions
- Supply air sensor (supplied in the connection module)

Without Air-Injector

Unit configured without vortex air distributor for connection to an on-site supply air duct and air distribution within the building, supply air temperature sensor supplied in the connection module.

Heat pump system

Highly efficient modulating air/air heat pump system for heating and cooling as a split system, comprising the following components:

- Reversible condensing unit
- Communication module
- Expansion valve (cooling)

Reversible condensing unit (Daikin ERQ250)

- Compact unit for outdoor installation
- Painted casing RAL 7044 (silk grey) made from galvanised sheet steel
- Speed-controlled scroll compressor
- Speed-controlled fan
- Coated Al/Cu finned-tube evaporator or condenser
- Electronic expansion valve (heating)
- 4-way valve for defrosting
- Shut-off valves on the working-medium side
- Working medium R 410A
- Terminal box

Communication module
Control box for communication between the condenser unit, expansion valve and ventilation unit and for measuring the temperatures of the gas and liquid upstream or downstream of the heating/cooling section. Installed in the roof unit of the ventilation unit and fully wired.

Expansion valve
Kit with electronic expansion valve (cooling), thermally insulated and protected against mechanical damage. For on-site installation on the side of the heating/cooling section.

Condensing unit options

Protection hood (side)
Hood made of painted steel for protection against wind and snow, to be mounted on the side of the condenser unit on site.

Protection hood (front)
Hood made of painted steel for protection against wind and snow, to be mounted on the front of the condenser unit on site.

Condensate drain pan
Pan made of painted steel for collecting and discharging the condensate, to be mounted on the bottom of the condenser unit on site.

Heating for condensate drain pan
Heating tape for protection against icing of the condensate in the condensate drain pan, for installation on site in the condenser unit.

Options for the unit

Supplementary heater with electric heating coil
Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain. The heating section contains:
- Electric coil, protected by safety temperature limiter, temperature monitoring and air flow monitoring, consisting of steel heating sections in a galvanized steel frame
- Terminal box for connecting the electrical supply
- Continuous regulation of the heating power via thyristor controller

Supplementary heater with hot water
Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials. The heating section contains:
- The highly efficient heating coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the hot water supply
- Frost controller

Paint finish of below-roof unit
Choice of external paint finish in RAL colour

Fresh air and exhaust air silencers
Fresh air silencer configured as add-on part for the roof unit which can be folded downwards, housing made of aluminium with a bird screen and acoustic insulation lining, for reducing sound emissions on the fresh air side; exhaust air silencer configured as add-on part for the roof unit which can be folded downwards, housing made of aluminium with bird screen and easily accessible sound attenuation splitters, optimised flow, with abrasion-resistant and easily cleaned surfaces, non-flammable, hygienically clean with high-quality glass filament cover for reducing sound emissions on the exhaust air side, insertion loss fresh air/exhaust air
_____ dB / _____ dB

Supply air and extract air silencers
Supply air silencer configured as separated component in the below-roof unit, flow-optimised sound attenuation splitters, with abrasion-resistant and easily cleaned surfaces, non-flammable, hygienically clean with high-quality glass filament cover, extract air silencer configured as acoustic insulation lining in the connection module, for reducing sound emission in the room, insertion loss supply air/extract air
_____ dB / _____ dB

Hydraulic assembly diverting system
(only for option of supplementary heater with hot water)
Prefabricated assembly for hydraulic diverting system, consisting of mixing valve, regulating valve, ball valve, automatic air vent and screw connections for connection to the unit and to the distributor circuit; mixing valve with plug-in connection, sized for the coil in the unit and the Hoval TopTronic® C control system.

Mixing valve
(only for option of supplementary heater with hot water)
Mixing valve with modulating rotary actuator and plug-in connection, sized for the coil in the unit.

Condensate pump
Consisting of a centrifugal pump and a drip tray, max. delivery rate of 150 l/h with a delivery head of 3 m.

Socket
230 V socket installed in the control block for simple supply of external, electrical units.

Energy monitoring
Consisting of 2 additional temperature sensors for recording the air inlet and air outlet temperatures of the plate heat exchanger. Energy monitoring makes it possible to display the energy saved by heat and cool recovery.

Pump control for mixing or injection system
(only for option of supplementary heater with hot water)
Electrical components for controlling a mixing or injection circuit in the load circuit.

Return temperature sensor
(only for option of supplementary heater with hot water)
Temperature sensor for monitoring the heating medium.

4.2 TopTronic® C control system

Freely configurable, zone-based control system ex-works for operation of decentralised Hoval indoor climate systems with optimised use of energy, suitable for demand-driven control of overall systems comprising up to 64 control zones each with up to 15 supply and extract air handling units or supply air units and 10 recirculation units.

System structure
- Unit controller: installed in the particular indoor climate unit
- Zone bus: as serial connection of all unit controllers in one control zone with the zone controller; with robust bus protocol via shielded and twisted-pair bus line (bus cables provided by the client)
- Zone control panel with:
  - System operator terminal
  - Fresh air temperature sensor
  - Zone controllers and room air temperature sensors
  - All components for the electrical power supply and protection
- System bus (Ethernet): for connecting all zone controllers to one another and to the system operator terminal (bus cables provided by the client)

Operation
- TopTronic® C-ST as system operator terminal: touch panel for visualisation and control by web browser via HTML interface, including software for LAN access
- TopTronic® C-ZT as zone operator terminal: for simple on-site operation of a control zone (optional)
- Manual operating selector switch (optional)
- Manual operating selector button (optional)
- Operating of the units via building management system via standardised interfaces (optional):
  - BACnet
  - Modbus IP
  - Modbus RTU

Control functions
- Control of the supply air temperature using room supply air cascade control via sequential control of the energy recovery of the heating/cooling section and if necessary of the supplementary heater (depending on the unit type)
- Demand-driven control of the supply air and exhaust air volumetric flows with minimum and maximum limit depending on the room temperature or, optionally, the room air quality (for supply and extract air handling units)
- Control of the unit including the air distribution according to the specifications of the zone controller
- Control of the condenser unit in heating or cooling mode as specified by the room control unit

Alarms, protection
- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 20 alarms; forwarding via e-mail can be set in the parameters.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (only for option of supplementary heater with hot water)
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

Options for the zone control panel
- Design for heat pump
- Cooling lock switch
- Heating/cooling switch
- Alarm lamp
- Socket
- Additional room air temperature sensors
- Combination sensor room air quality, temperature and humidity
- External sensor values
- External set values
- Load shedding input
- Operating selector switch on terminal
- Operating selector button on terminal
- Power supply for air handling unit
- Power supply for heat pump system
- Power supply for electric heating coil (only for option of supplementary heater with electric heating coil)
- Safety relay
- Design for heating (only for option of supplementary heater with hot water)
- Control and power supply for distributor pump (only for option of supplementary heater with hot water)

Options

1 Type code

RP - 6 A K - RX / ST . -- / V0 . D1 . LU / AF . SI / Y . KP . -- . SD / TC . EM . PH . RF

Unit type

RoofVent® RP

Unit size

6 or 9

Heating section

- without heating section
A with coil type A (hot water)
R with coil type R (electric)
S with coil type S (electric)

Heating/cooling section

K with coil type K (1 heat pump)
M with coil type M (2 heat pumps)

Heat recovery

RX Temperature efficiency ErP 2018

Design

ST Standard

Connection module

V0 Standard
V1 Length + 250 mm
V2 Length + 500 mm
V3 Length + 1000 mm

Air outlet

D1 Design with 1 Air-Injector
D2 Design with 2 Air-Injectors
D0 Design without Air-Injector

Paint finish

- without
LU Paint finish of below-roof unit

Silencer outside

- without
AF Fresh air and exhaust air silencer

Silencer inside

- without
SI Supply air and extract air silencer

Options

RP - 6 A K - RX / ST . -- / V0 . D1 . LU / AF . SI / Y . KP . -- . SD / TC . EM . PH . RF

Hydraulics

- without
Y Hydraulic assembly diverting system
M Mixing valve

Condensate pump

- without
KP Condensate pump

Socket

- without
SD Socket in the unit
CH Socket in the unit Switzerland

Control system

TC TopTronic® C

Energy monitoring

- without
EM Energy monitoring

Pump control

- without
PH Heating pump

Return temperature sensor

- without
RF Return temperature sensor

2 Connection module

The connection module is available in 4 lengths for adapting the RoofVent® unit to local conditions.

3 Design with 2 Air-Injectors

A supply air duct can be connected to the RoofVent® unit for distributing the supply air over a very wide area. 2 Air-Injectors can be installed on this. The supply air duct and the cabling must be provided by the client.

Notice
An actuator is installed in each of the 2 Air-Injectors. The supply air temperature sensor is supplied in the connection module; it is to be installed in the supply air duct by the client.

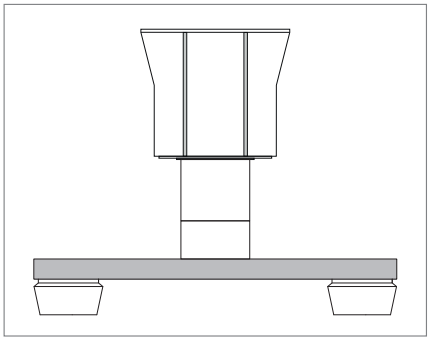
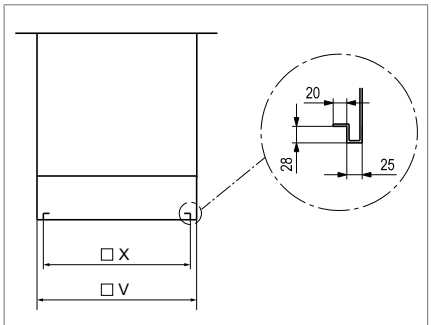


Fig. C1: RoofVent® unit with supply air duct and 2 Air-Injectors



Size		6	9
X	mm	850	1050
V	mm	900	1100

Table C1: Connection dimensions supply air duct (in mm)

4 Design without Air-Injector

RoofVent® units in the design without Air-Injector are suitable for connecting to an air distribution system supplied by the client.

Notice
The supply air temperature sensor is supplied in the connection module; it is to be installed in the supply air duct by the client.

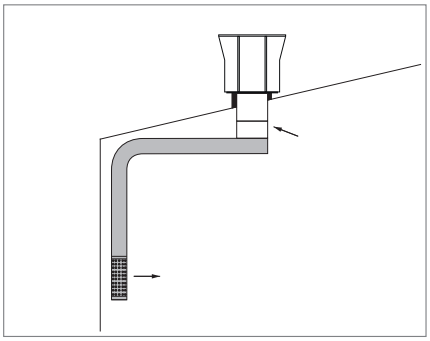


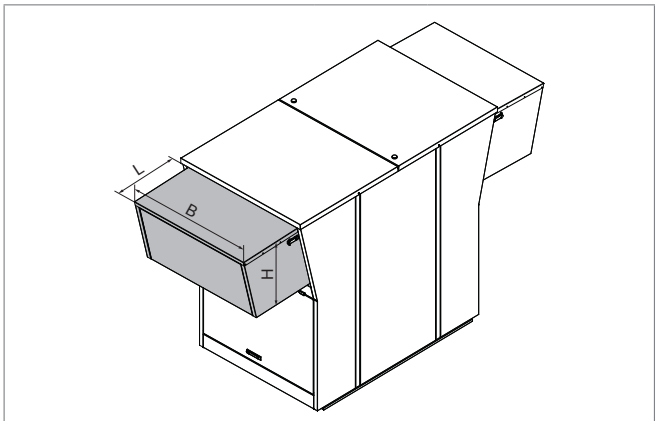
Fig. C2: Connection to an air distribution system supplied by the client (for dimensions see Table C1).

5 Paint finish of below-roof unit

The entire below-roof unit is painted in any colour. If the below-roof unit is equipped with a supply air silencer, this is also painted.

6 Fresh air and exhaust air silencers

The fresh air silencer reduces noise emissions from RoofVent® units on the fresh air side. It consists of an aluminium casing with a bird screen and acoustic insulation lining and is configured as an add-on part for the roof unit which can be folded downwards.



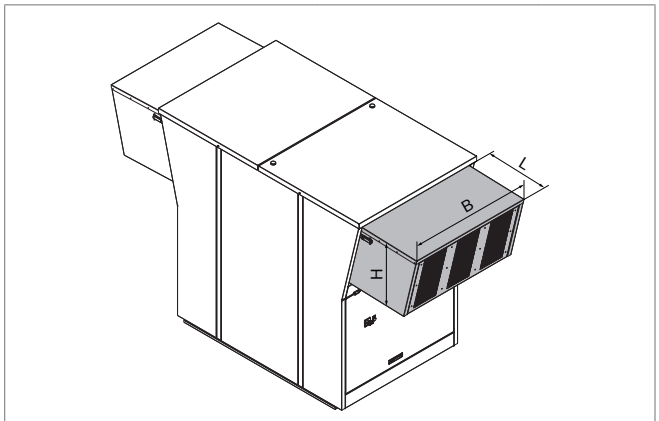
Size		6	9
L	mm	625	625
B	mm	1280	1630
H	mm	650	650
Weight	kg	30	42
Pressure drop	Pa	10	10

Table C2: Technical data fresh air silencer

Frequency	Size 6	Size 9
63 Hz	0	0
125 Hz	1	1
250 Hz	3	3
500 Hz	4	4
1000 Hz	4	4
2000 Hz	4	4
4000 Hz	3	3
8000 Hz	3	3
Total	**3**	**3**

Table C3: Insertion attenuation fresh air silencer (values in dB, relating to the nominal air flow rate)

The exhaust air silencer reduces noise emissions from RoofVent® units on the exhaust air side. It consists of an aluminium casing with a bird screen and sound attenuation splitters and is configured as an add-on part for the roof unit which can be folded downwards.



Size		6	9
L	mm	625	625
B	mm	1280	1630
H	mm	650	650
Weight	kg	52	68
Pressure drop	Pa	50	53

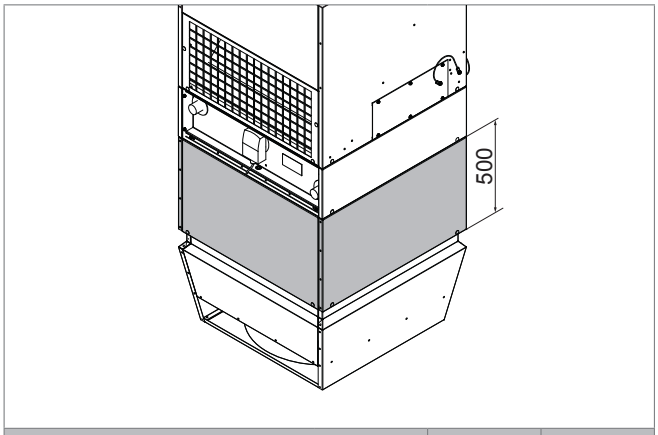
Table C4: Technical data exhaust air silencer

Frequency	Size 6	Size 9
63 Hz	2	2
125 Hz	3	3
250 Hz	9	9
500 Hz	11	11
1000 Hz	15	15
2000 Hz	14	14
4000 Hz	10	10
8000 Hz	8	8
Total	11	11

Table C5: Insertion attenuation exhaust air silencer (values in dB, relating to the nominal air flow rate)

7 Supply air and extract air silencers

Supply air and extract air silencers reduce the noise from RoofVent® units within the room. The supply air silencer is designed as a separated component and is installed above the Air-Injector. The extract air silencer consists of acoustic insulation lining in the connection module.



Size		6	9
Weight	kg	53	80
Supply air pressure drop	Pa	22	26
Extract air pressure drop	Pa	0	0

Table C6: Technical data supply air and extract air silencers

	Supply air		Extract air	
Frequency	Size 6	Size 9	Size 6	Size 9
63 Hz	7	5	0	0
125 Hz	9	7	0	0
250 Hz	15	15	2	2
500 Hz	17	17	3	3
1000 Hz	19	20	3	3
2000 Hz	15	17	3	3
4000 Hz	13	12	2	2
8000 Hz	10	9	2	2
Total	**15**	**15**	**2**	**2**

Table C7: Insertion attenuation supply and extract air silencers (values in dB, relating to the nominal air flow rate)

8 Hydraulic assembly diverting system

Notice
This option is only available for units with supplementary hot water heater.

Assemblies for hydraulic diverting which are optimally matched to the units are available for easy installation of RoofVent® units. Please note the following:

- Install the assembly horizontally.
- Mount the assembly so that its weight does not need to be absorbed by the coil.
- Insulate the assembly.

Default settings for the hydraulic alignment

Read off the default settings from Fig. C3. The curves 1.0 to 4.0 correspond to the revolutions of the valve spindles of the balancing valve; they are shown on the turning knob:
0.0 __ Valve closed
4.0 __ Valve fully open
The coil and the hydraulic assembly are already included in the specified pressure drops. Thus, only consider the pressure drops of the distributor circuit up to the screw connections.

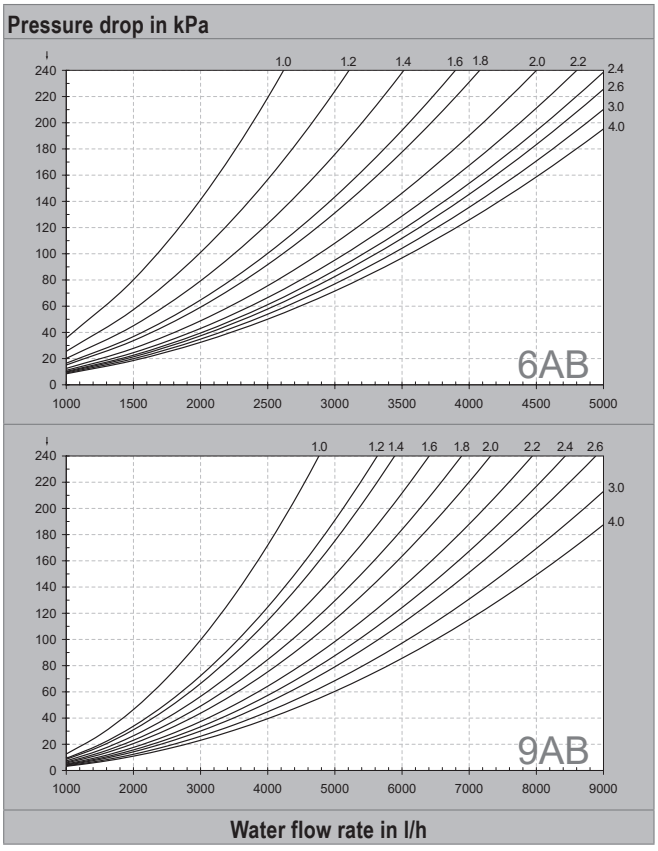
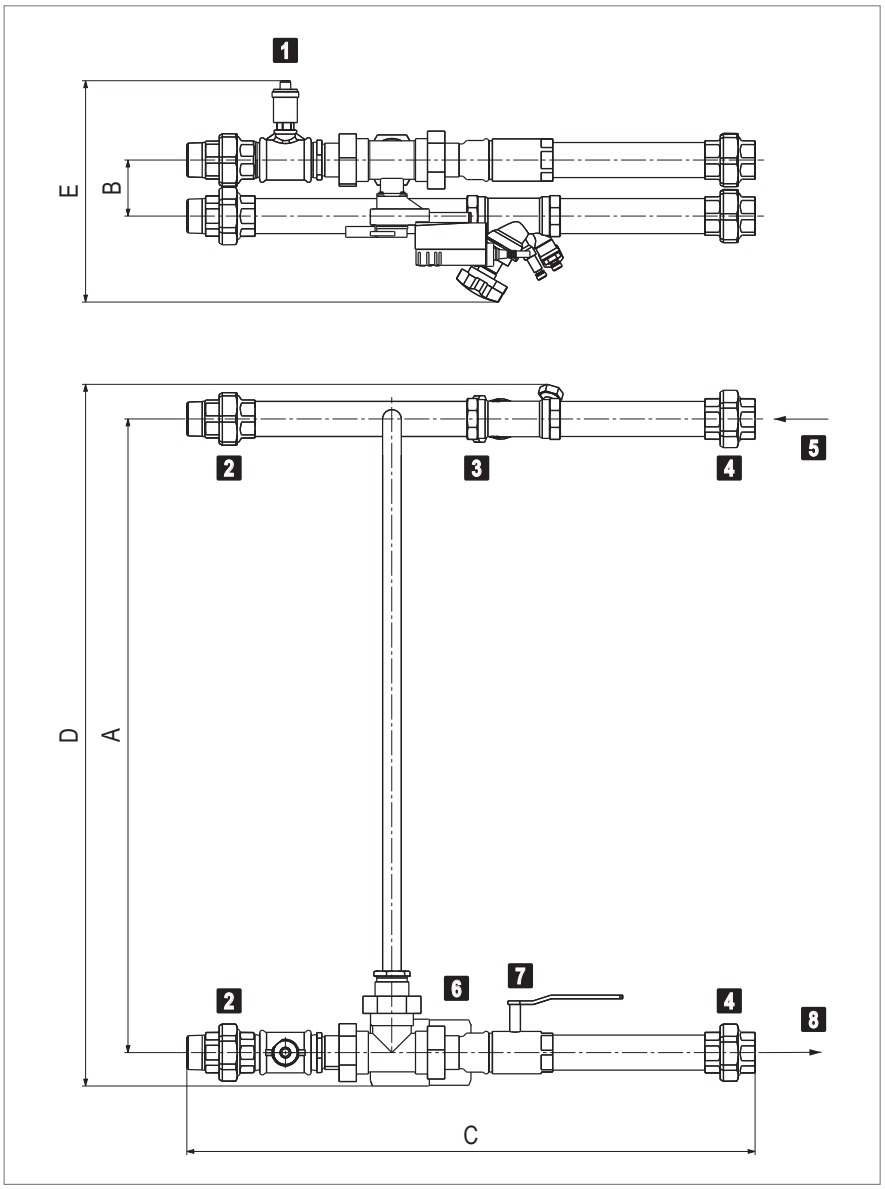


Fig. C3: Default settings for the balancing valves



1 Automatic air vent
2 Coil screw joint
3 Control valve
4 Distributor circuit screw joint
5 Flow
6 Mixing valve
7 Ball valve
8 Return

Fig. C4: Dimensional drawing for hydraulic assembly

Type	A	B	C	D	E	Mixing valve	Control valve	Screw joint
Y-6AB	758	78	726	853	300	20-6.3HV	STAD DN32	1¼ "
Y-9AB	882	78	770	977	320	25-10HV	STAD DN40	1½ "

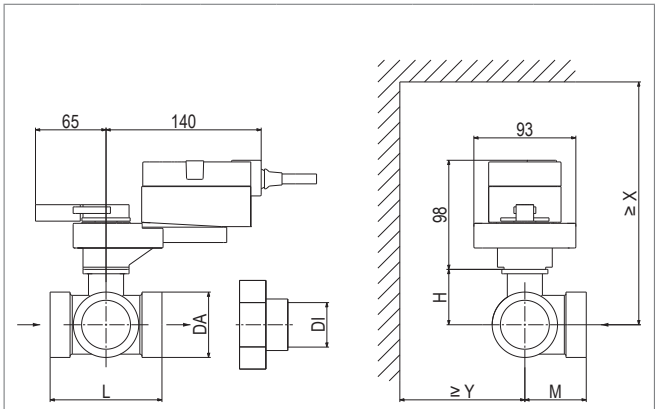
Table C8: Dimensions (in mm) and valves of the hydraulic assembly

9 Mixing valve

Notice
This option is only available for units with supplementary hot water heater.

Mixing valves which are optimally matched to the units are available for easy installation of RoofVent® units. They have the following specifications:

- 3-way mixing valve with modulating rotary actuator (run time 90 s)
- Flow characteristic:
  - Equal percentage control path
  - Linear bypass
- Integrated position control and response



Type	DN	kvs	DA	DI	L	H	M	X	Y
		m³/h	"	"	mm	mm	mm	mm	mm
M-6AB	20	6.3	G 1¼	Rp ¾	86	46	42	220	90
M-9AB	25	10	G 1½	Rp 1	85	46	45	220	90

Table C9: Mixing valve dimensions

Type	Weight
M-6AB	2.6
M-9AB	3.1

Table C10: Mixing valve weights (in kg)

10 Condensate pump

RoofVent® cooling units must be connected to a condensate drainage system. For applications in which connection to the waste water system is too expensive or not possible for structural reasons, a condensate pump can be provided. This is installed directly under the condensate drain connection; the supplied container is prepared for installation on the Air-Injector. It pumps the condensate through a flexible hose to a delivery head of 3 m, thus enabling discharge of the condensate

- through waste water pipes directly below the ceiling,
- onto the roof.

Flow rate (at 3 m delivery head)	l/h	max. 150
Tank capacity	l	max. 1.9
Dimensions (L x W x H)	mm	288 x 127 x 178
Weight	kg	2.4

Table C11: Condensate pump technical data

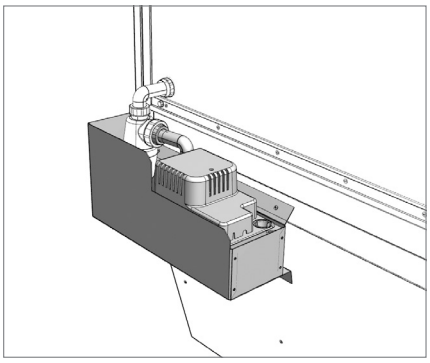


Fig. C5: Condensate pump

11 Socket

For maintenance work, a socket (1-phase, 230 V AC, 50 Hz) can be installed in the roof unit, next to the control block.

12 Energy monitoring

Energy monitoring makes it possible to display the energy saved by heat and cool recovery. For this purpose, 2 additional temperature sensors are installed in the RoofVent® units; they record the air inlet and air outlet temperatures of the plate heat exchanger.

13 Return temperature sensor

Notice
This option is only available for units with supplementary hot water heater.

The return temperature sensor monitors the return temperature of the heating medium. If necessary, it triggers frost pre-control at the heating valve to prevent the system possibly being shut down due to frost.

14 Pump control for mixing or injection system

Notice
This option is only available for units with supplementary hot water heater.

Instead of the diverting system, an mixing or injection circuit can also be installed in the load circuit.

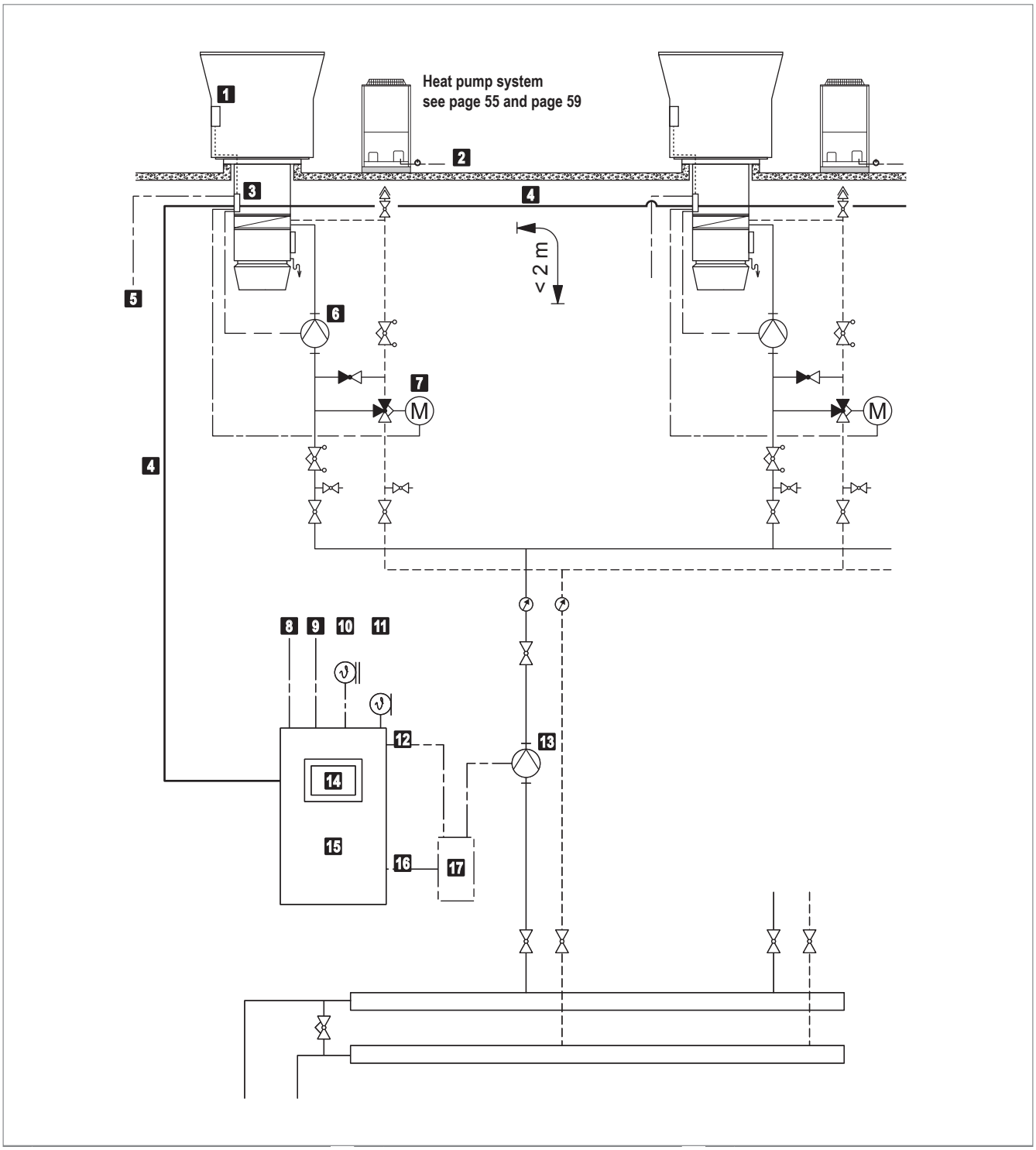
Please note the following:
- Not only the mixing valves but also the pumps in the load circuit are controlled directly by the control block.
- Terminals for wiring the mixing valves and the pumps in the load circuit are located in the connection box.
- Make sure that valves and pumps which meet the following requirements are provided on site.

14.1 Requirements for mixing valves

- Use 3-way mixing valves with the following flow characteristics:
  - Equal percentage control path
  - Linear bypass
- The valve authority must be ≥ 0.5.
- The maximum run time of the valve actuator is 90 s.
- The valve actuator must be continuous, i.e. the stroke changes in proportion to the control voltage (0…10 VDC or 2…10 VDC).
- The valve actuator must be designed with a position response (0...10 VDC or 2…10 VDC).
- The maximum power consumption is 20 VA.
- Install the valve close to the unit (max. distance 2 m).

14.2 Requirements for pumps

- Voltage ..... 230 VAC
- Current ..... up to 4.0 A



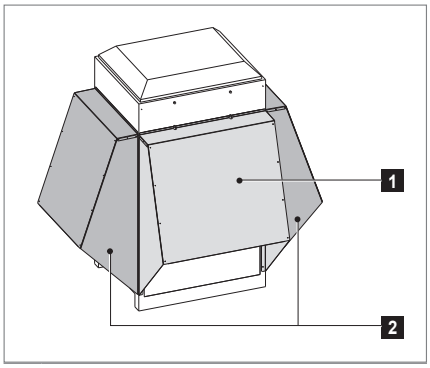
1	Control block	7	Mixing valve	13	Distributor pump
2	Power supply for condensing unit	8	Power supply control panel	14	System operator terminal
3	Connection box	9	Collective alarm	15	Zone control panel
4	Zone bus	10	Fresh air temperature sensor	16	Heating demand
5	Power supply RoofVent®	11	Room temperature sensor	17	Heating control panel
6	Heating pump	12	Fault heat supply		

Table C12: Schematic diagram for RoofVent® RP injection system (supplementary heater with hot water)

15 Condensing unit options

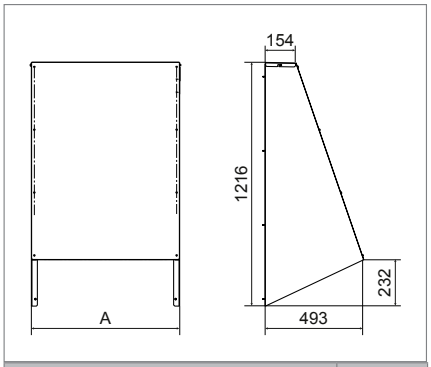
15.1 Protection hood

Protection hoods protect the condensing unit against strong wind and heavy snowfall. They are installed on the side and/or front of the unit.



1 Front protection hood
2 Side protection hoods

Fig. C6: Condensing unit with protection hoods



Dimension	A
Front protection hood	930
Side protection hood	740

Fig. C7: Dimensions protection hood (in mm)

15.2 Condensate drain pan

The condensate drain pan collects and discharges the condensate. It is installed on the bottom of the condensing unit. The controlled discharge of the condensate prevents damage caused by ice forming under the unit.

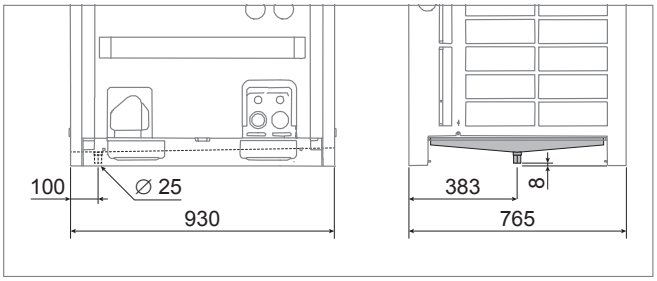


Fig. C8: Dimensions condensate drain pan (in mm)

15.3 Heating for condensate drain pan

The heating tape prevents the condensate from freezing in the condensate drain pan and thus protects the unit against damage. It is installed in the condensing unit and connected in the condensing unit terminal box. Power: 250 W.

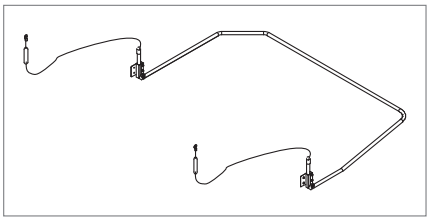


Fig. C9: Heating for condensate drain pan

C

Transport and installation

1 Installation

1.1 Preparation

The following guidelines are important when preparing for installation:

- The scope of delivery includes:
  - RoofVent® unit, delivered in 2 parts on pallets (roof unit, below-roof unit)
  - Condensing unit
  - Accessories (installation material, extract air filter, trap, temperature sensor, expansion valve)
  - Optional components
- The units are installed in or on the roof. A crane or helicopter is required.

RoofVent® unit

- Transport eyes are supplied for lifting the below-roof unit and the roof unit.
  - Use lifting ropes at least 2 m in length to lift the below-roof unit.
  - Use lifting ropes at least 3 m in length to lift the roof unit.
- Depending on the unit size, the below-roof unit can be delivered in 2 parts.
- Make sure that the roof frame corresponds to the specifications in chapter 1.3.
- A sealing compound is required for sealing (e.g. PU foam).
- Define the desired orientation of the units (position of the refrigerant connections).

Notice
The standard position of the refrigerant connections is underneath the extract air grille. Check the local installation conditions. If another orientation is required, the heating or cooling section can be mounted turned round on the connection module.

- Fresh air and exhaust air silencers are supplied separately. Install them on the unit before transporting it to the roof, and make sure they are locked.
- Follow the installation instructions included.

Notice
Provide suitable protective devices and make sure the units can be accessed easily. The maximum roof load of the RoofVent® units is 80 kg.

Condensing unit

- Lifting the condensing unit with a crane:
  - Use 2 straps at least 8 m in length.
- Lifting the condensing unit with a forklift:
  - Transport to the installation site: Lift the unit under the pallet.
  - Unloading from the pallet: Guide the forklift tines into the large rectangular openings under the device.
- Follow the installation instructions included.

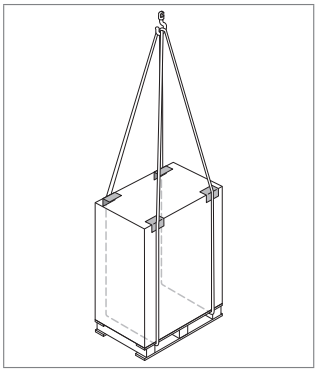


Fig. D1: Lifting with a crane

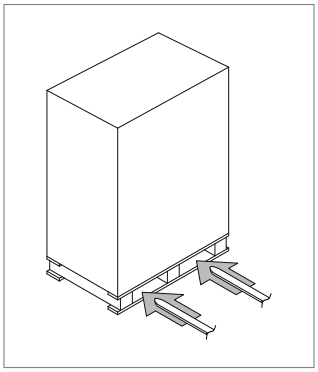
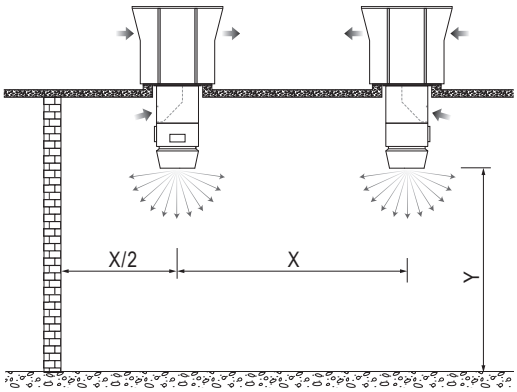


Fig. D2: Lifting with a forklift

1.2 Positioning

RoofVent® unit

- Comply with the minimum and maximum distances.
- Pay attention to the alignment of the units relative to each other. Units must not draw in exhaust air from other units as fresh air.
- All air inlet and air outlet openings must be freely accessible. The supply air jet must be free to spread out unhindered.
- The access doors in the roof unit and the access panels in the below-roof unit must be easily accessible.
- Clearance of at least 0.9 m is required for maintenance work around the heating/cooling section and, if applicable, the supplementary heater.

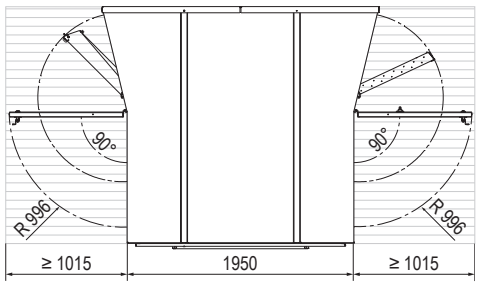


Size			6	9
Distance X	min.	m	11	13
	max.	m	22	28
Mounting height Y	min.	m	4	5
	max. [1]	m	Approx. 9…25	

1) The maximum mounting height varies depending on the boundary conditions (for values, see table of heat outputs or calculation with the 'HK-Select' selection program)

Table D1: Minimum and maximum distances

Roof unit



Roof unit with silencers

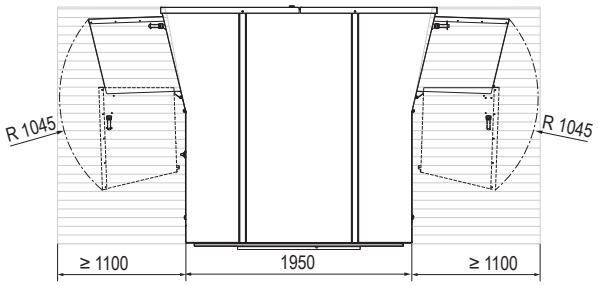


Fig. D3: Space requirements for maintenance on the roof (dimensions in mm)

Notice
If side access is not possible, proportionally more space is required for opening the access doors.

Condensing unit

- Comply with the minimum distances for free air entry: 0.6 m at the front side and 0.2 m to the left and right.
- The outgoing air jet must be free to spread upwards unhindered.
- Clearance of at least 0.9 m is required for maintenance work at the rear side of the unit.
- Make sure that the air inlet and outlet are not in the direction of the prevailing wind. If necessary, use a protection hood (option) to protect the condensing unit.
- Protect the condensing unit against heavy snow fall.
- Install the condensing unit on a level base with an adequate load bearing capacity so as to avoid vibration and noise.
- Install the condensing unit on a solid base at least 150 mm tall (steel frame or concrete).
- If the condensing unit is mounted on a frame: attach a waterproof plate about 150 mm underneath the unit to prevent water penetrating the unit from below.

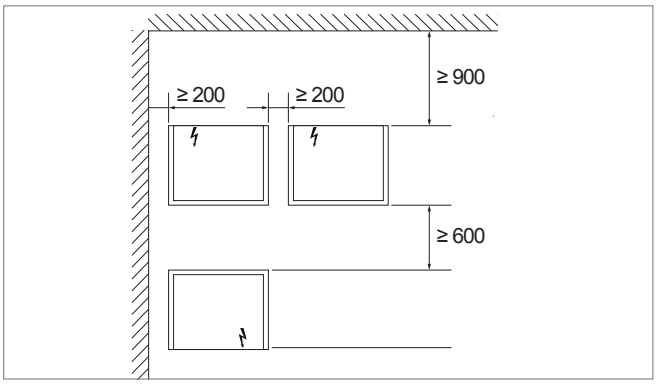


Fig. D4: Space requirements for condensing unit (dimensions in mm)

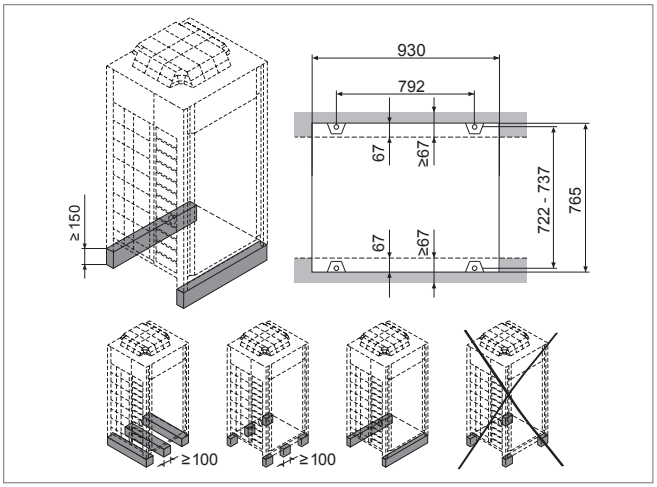


Fig. D5: Frame for condensing unit (dimensions in mm)

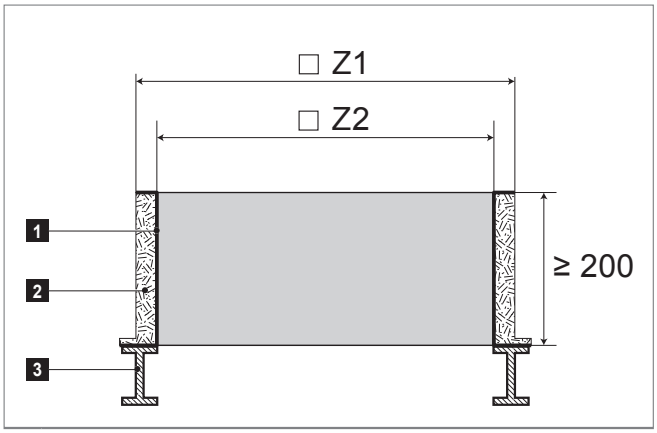
1.3 Roof frame

Roof frames are required for installing RoofVent® units in the roof. Please consider the following in the design process:

- The extract air grille and the access panels must be freely accessible under the roof.
- The roof frame must protrude at least 200 mm from the roof, so that no water can penetrate during a rainstorm or snowfall.

> **Notice**
> The connection module is available in 4 lengths for adapting to the local installation situation.

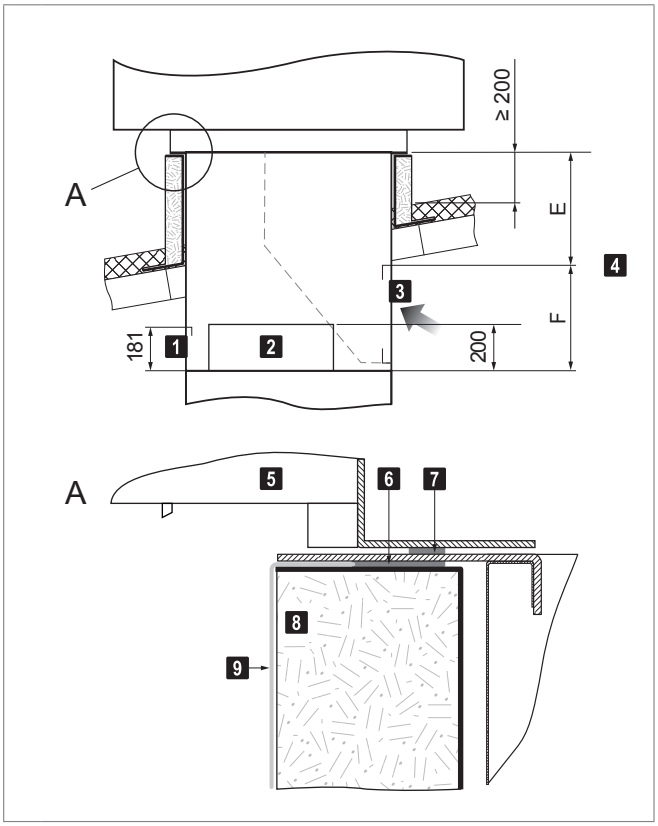
- The opening (dimension Z2) must be large enough to accommodate the below-roof unit.
- The condensate must be able to drain off freely.
- The roof frame must be flat and horizontal.
- Insulate the roof frame before installing the unit (e.g. 40 mm PU foam).
- Please observe the minimum distances when designing the roof frame (see chapter 1.2). Change the orientation of the refrigerant connections, if necessary.



1	Weight-bearing inner wall of the roof frame
2	Insulation (e.g. 40 mm PU foam)
3	IPE beam

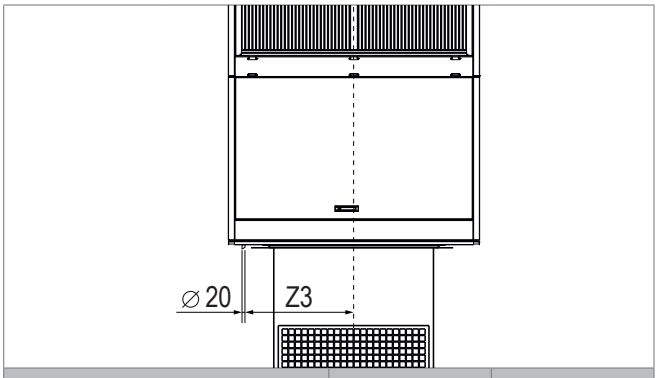
Size			6	9
Z1	max.	mm	1110	1460
Z2	min.	mm	962	1162
	max.	mm	970	1170

Table D2: Dimensions for roof frame



1	Access panel, connection box
2	Coil access panel (both sides)
3	Extract air grille
4	Dimensions E and F see 'Technical data' chapter
5	Roof unit
6	Sealing compound (on site)
7	Sealing strip (fitted at the factory)
8	Roof frame
9	Membrane

Fig. D6: Installation of RoofVent® units in the roof frame (dimensions in mm)



Size		6	9
Z3	mm	571	749

Table D3: Condensate drain of the plate heat exchanger (measured from unit centre)

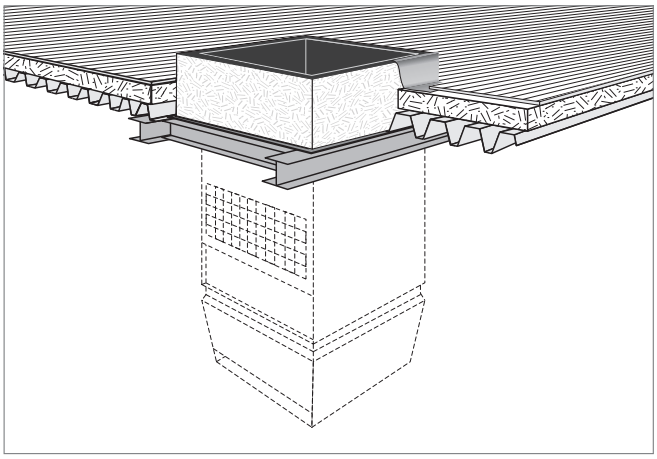


Fig. D7: Conceptual drawing of the roof frame

Depending on local conditions, 2 different types of roof frame can be used:

- Roof frame with straight side walls (where there is sufficient space)
- Roof frame with conical side walls (where a below-roof unit protruding into the room interferes with the craneways, for example)

Notice
Ensure there is sufficient clearance for maintenance work (see chapter 1.2).

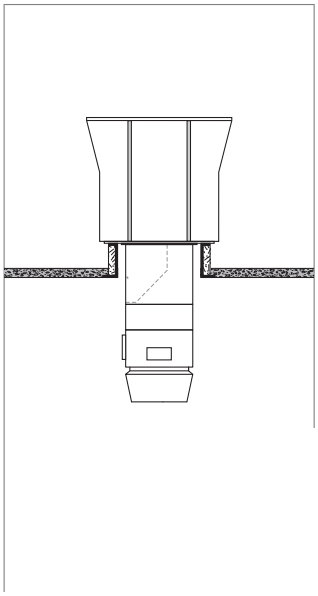
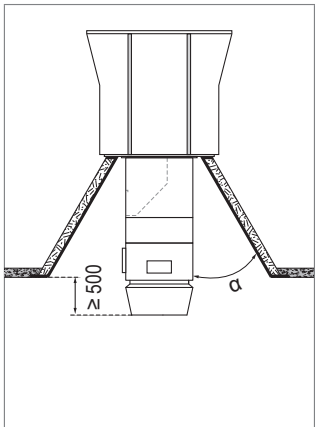


Fig. D8: Roof frame with straight side walls



RoofVent®	α
without supplementary heater	20…45°
with supplementary heater	40…45°

Fig. D9: Roof frame with conical side walls

1.4 Unit installation

Proceed as follows to position the unit:

Below-roof unit

- Apply sealing compound to the roof frame.
- Screw in the transport eyes and attach the lifting gear.
- Transport the below-roof unit to the roof frame using a helicopter or crane.
- Turn the below-roof unit to the desired position.
- Hang the below-roof unit into the roof frame from above.

Roof unit

- Remove the cover caps on the unit roof.
- Screw in the transport eyes and attach the lifting gear.
- Transport the roof unit to the roof, correctly position the roof unit over the below-roof unit and set it down.
- Screw the the roof unit and below-roof unit together.
- Remove the transport eyes and refit the cover caps.

Heat pump system

- Transport the condensing unit to the installation site.
- Place the unit on the prepared frame.
- Fasten the unit with 4 M12 anchor bolts.
- Fit the expansion valve on the heating/cooling section of the below-roof unit.

1.5 Duct connection

If necessary, it is possible to connect an extract air duct to the below-roof unit instead of the extract air grille.

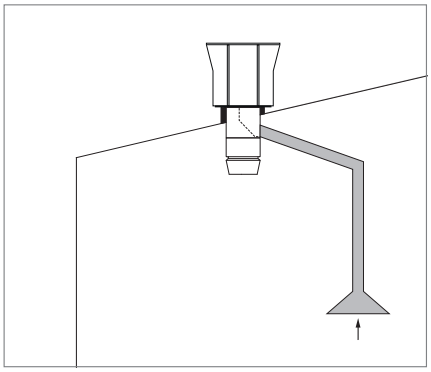
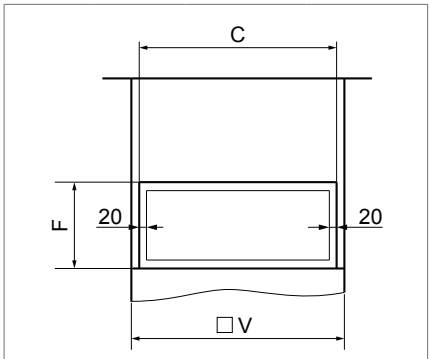


Fig. D10: Extract air duct



Size		6	9
C	mm	848	1048
F	mm	410	450
V	mm	900	1100

Table D4: Connection dimensions (in mm)

2 Refrigeration system installation

The refrigerant pipes must be installed by a qualified refrigeration technician in line with the local regulations.

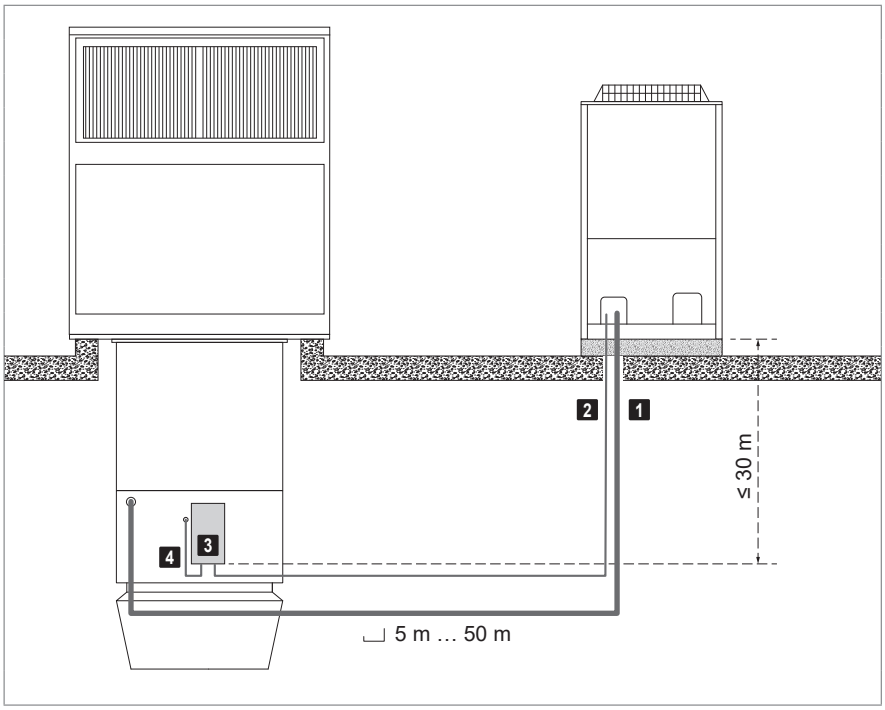
To avoid damaging the unit:
- Do not use any flux.
- Ensure there is a nitrogen supply when soldering.
- Insulate the refrigerant pipes.
- Carry out an air-tightness test and vacuum drying.

Install the refrigerant pipes according to Fig. D11 and Fig. D12. Use the enclosed connection pipe to connect the expansion valve to the condenser/evaporator.

Refrigerant pipe specifications
- Material:
  - Liquid line: annealed copper
  - Gas line (suction gas): semi-hard copper
- Diameter:
  - Liquid line .....9.5 mm
  - Gas line (suction gas).....22.2 mm
- The pipe thickness must correspond to the applicable local regulations.
- Connections on the condensing unit:
  - Left, front or right

Filling with refrigerant
- The condensing unit is filled with refrigerant at the factory:
  - Refrigerant R410A
  - Fill volume: 8.4 kg
- The additional amount of refrigerant depends on the total length of the liquid line (300 g – 3 kg).
- Refrigerant R410A is a mixture. It is essential to add it in the liquid state. The composition can vary in the gaseous state.

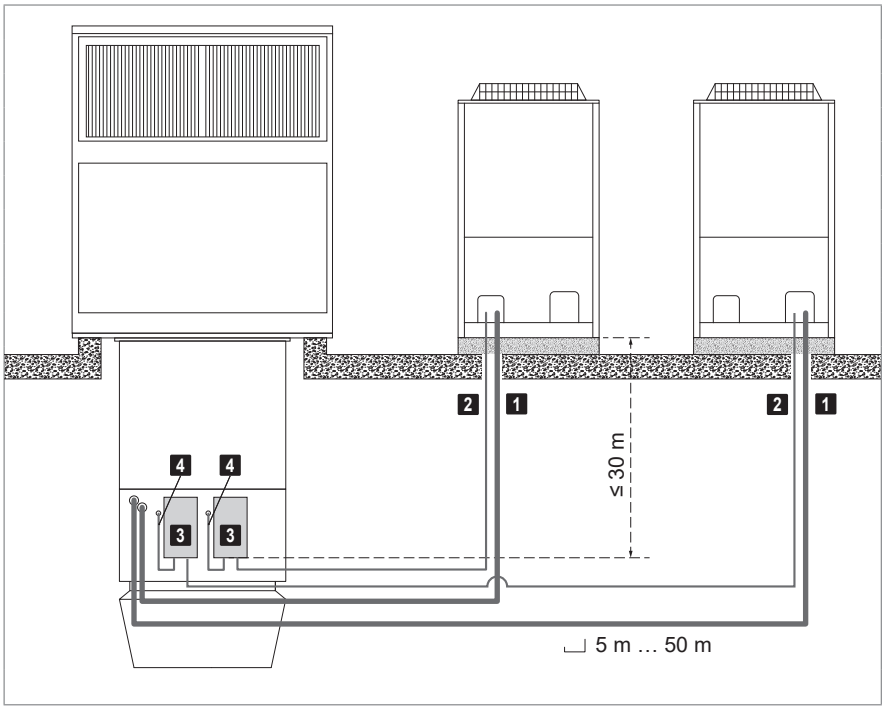
Refrigerant pipes for RoofVent® RP with 1 heat pump system



1 Gas line (∅ 22.2 mm)
2 Liquid line (∅ 9.5 mm)
3 Expansion valve (supplied loose)
4 Connection pipe (supplied loose)

Fig. D11: Refrigerant pipes to be installed on site for RoofVent® RP-6…K, RP-9…K

Refrigerant pipes for RoofVent® RP with 2 heat pump systems



1 Gas line (∅ 22.2 mm)
2 Liquid line (∅ 9.5 mm)
3 Expansion valve (supplied loose)
4 Connection pipe (supplied loose)

Fig. D12: Refrigerant pipes to be installed on site for RoofVent® RP-9-M

3 Hydraulic installation

3.1 Condensate connection

Below-roof unit

Condensate arising in the below-roof unit must be removed via a condensate-proof line.

- Install and insulate the supplied trap on the condensate connection of the unit.
- Dimension the slope and cross-section of the condensate line so that no condensate backflow takes place.
- Make sure that the condensate produced is drained in compliance with local regulations.
- Route the condensate line from the pump directly upwards.

Notice
Use the 'Condensate pump' option for quick and easy hydraulic installation.

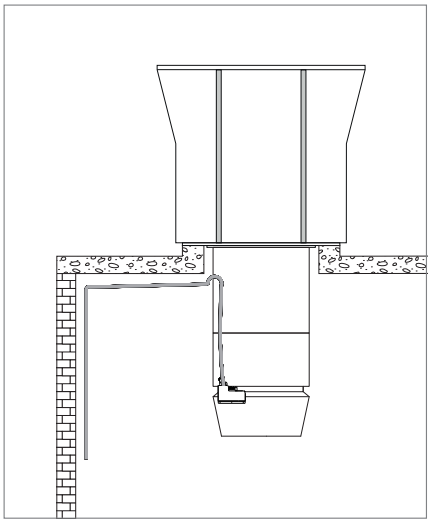


Fig. D13: Condensate line

Condensing unit

- Make sure that the condensing unit is not damaged by pooling water or ice formation:
  - Create a condensate drain.
  - Provide heating for the condensate drain.

Notice
Use the 'Condensate drain pan' and 'Heating for condensate drain pan' options to discharge the condensate in a controlled manner.

3.2 Hot water heating coil (option)

The TopTronic® C control system is designed for a distributor circuit with separate hydraulic connection of the units; i.e. a mixing valve is installed in front of each unit. The diverting system is used as standard.

Requirements on the boiler system and the distributor circuit

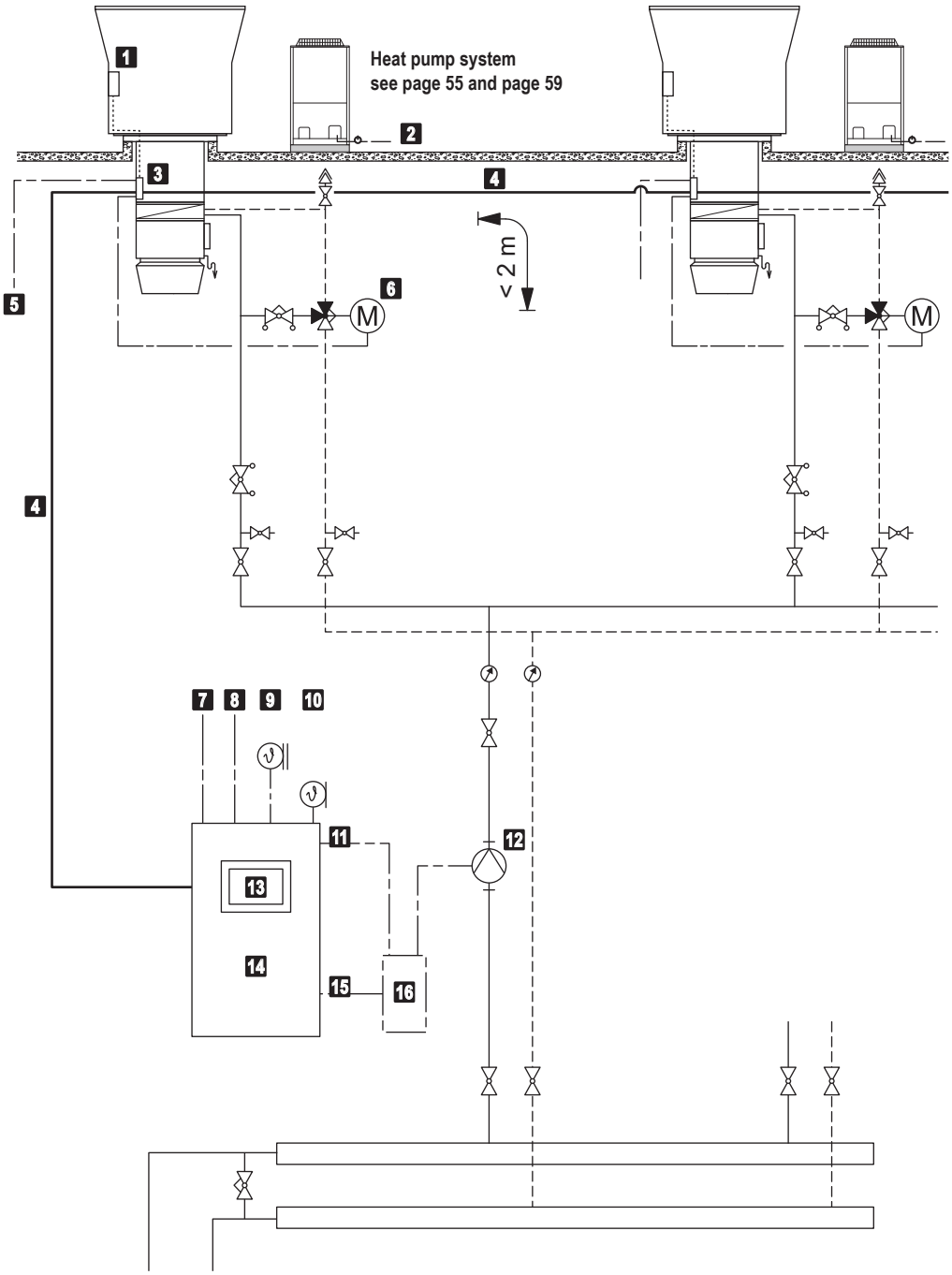
- Hydraulically coordinate the pipework for the individual units within a control zone to ensure even distribution.
- The heating medium must be available at the mixing valve without delay in the required amount and temperature.
- Depending on local conditions, check whether compensators for linear expansion are required for the supply and return lines and/or articulated connections are required for the units.
- Do not fasten any loads to the coil, e.g. by means of the flow or return lines.
- Insulate the hydraulic lines.

The TopTronic® C control system switches on the heating pump and the heating demand every day. This prevents the pump from jamming in case of a long shutdown.

Requirements for mixing valves

- Use 3-way mixing valves with the following flow characteristics:
  - Equal percentage control path
  - Linear bypass
- The valve authority must be ≥ 0.5.
- The maximum run time of the valve actuator is 90 s.
- The valve actuator must be continuous, i.e. the stroke changes in proportion to the control voltage (0…10 VDC or 2…10 VDC).
- The valve actuator must be designed with a position response (0...10 VDC or 2…10 VDC).
- The maximum power consumption is 20 VA.
- Install the valve close to the unit (max. distance 2 m).

Notice
Use the 'Hydraulic assembly' or 'Mixing valve' options for quick and easy hydraulic installation.



1	Control block	7	Power supply control panel	13	System operator terminal
2	Power supply for condensing unit	8	Collective alarm	14	Zone control panel
3	Connection box	9	Fresh air temperature sensor	15	Heating demand
4	Zone bus	10	Room temperature sensor	16	Heating control panel
5	Power supply RoofVent®	11	Fault heat supply		
6	Mixing valve	12	Distributor pump		

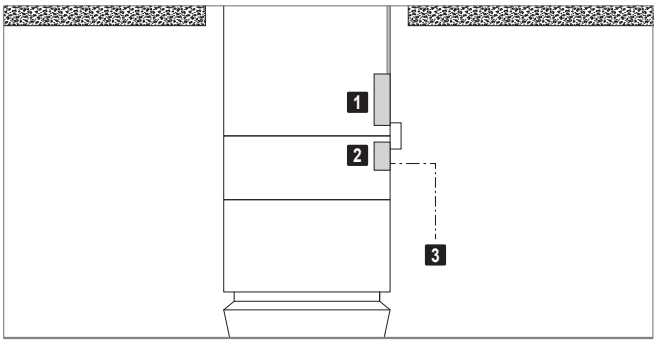
Table D5: Schematic diagram for hydraulic diverting system (supplementary heater with hot water)

4 Electrical installation

- The electrical installation must only be carried out by a qualified electrician.
- Observe the relevant regulations (e.g. EN 60204-1).
- Choose the dimensions of the cable cross sections in line with the applicable regulations.
- Route signal and bus lines separately from mains cables.
- Make sure the lightning protection system for the units or for the entire building is planned and carried out by professionals.
- Provide overload protection equipment on site in the mains connection line of the zone control panel.

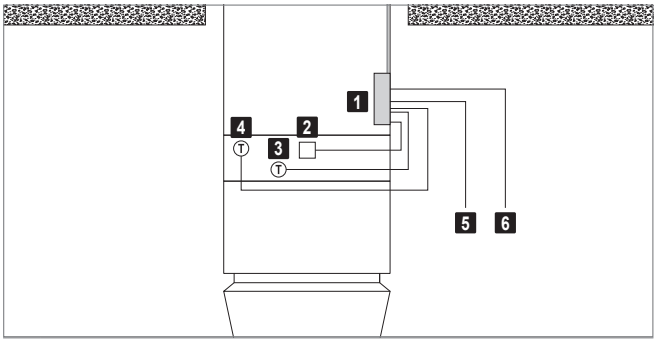
Attention
Use an all-pole sensitive residual current circuit breaker for a leakage current protective circuit.

- Carry out the electrical installation according to the wiring diagram:
  - Power supply for RoofVent® RP
  - Power supply for electric heating coil (option)
  - Power supply for condensing unit with leakage current protective circuit and main switch with auxiliary contact in view of the heat pump (NO contact, provided by the client)
  - Zone bus based on system layout
  - Signal lines
- In the RoofVent® RP unit, connect the connection box in the below-roof unit to the control block in the roof unit.
- Connect the electrical components of the below-roof unit to the connection box.
- Connect the electrical components of the heat pump system.



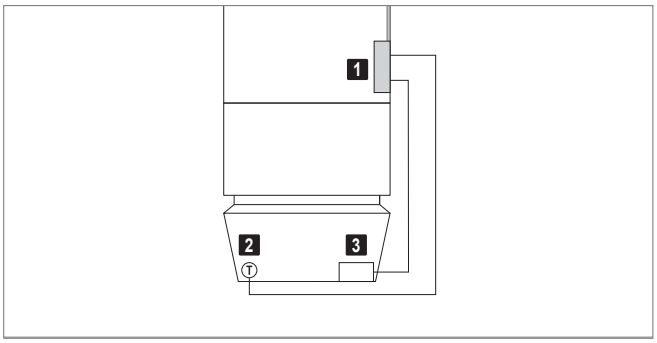
1 Connection box in the connection module
2 Electric heating coil connection
3 Power supply for electric heating coil

Fig. D14: On-site electrical connection of the electric heating coil (option)



1 Connection box in the connection module
2 Frost controller
3 Temperature sensor air outlet supplementary heater
4 Return temperature sensor (option)
5 Mixing valve
6 Pump (option)

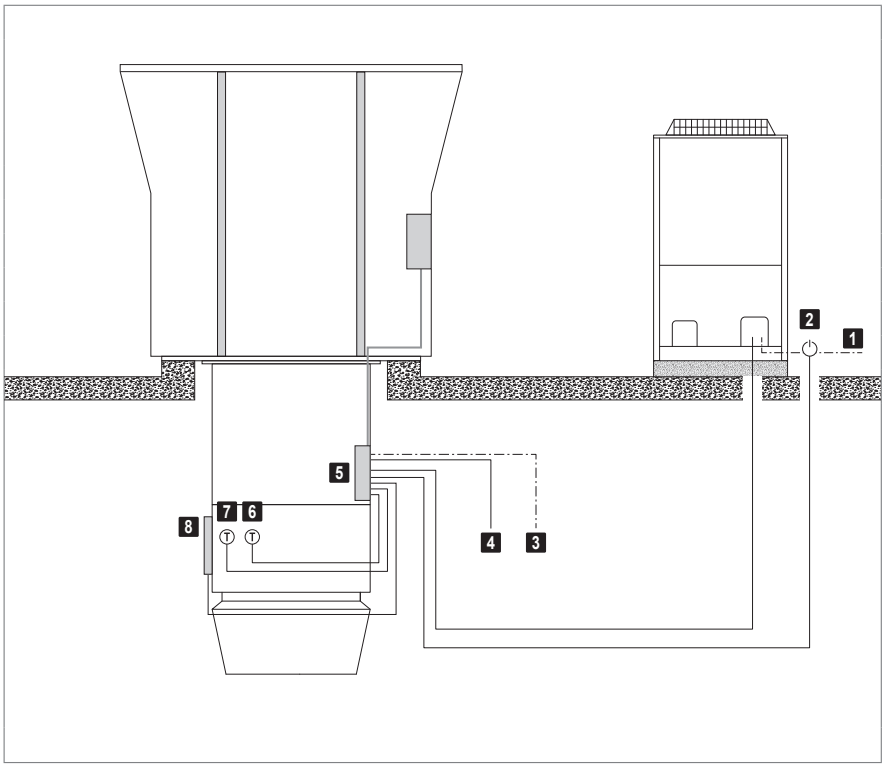
Fig. D15: On-site electrical connection of the hot water heating coil (option)



1 Connection box in the connection module
2 Supply air temperature sensor
3 Actuator Air-Injector

Fig. D16: On-site electrical connection of the Air-Injector and supply air temperature sensor

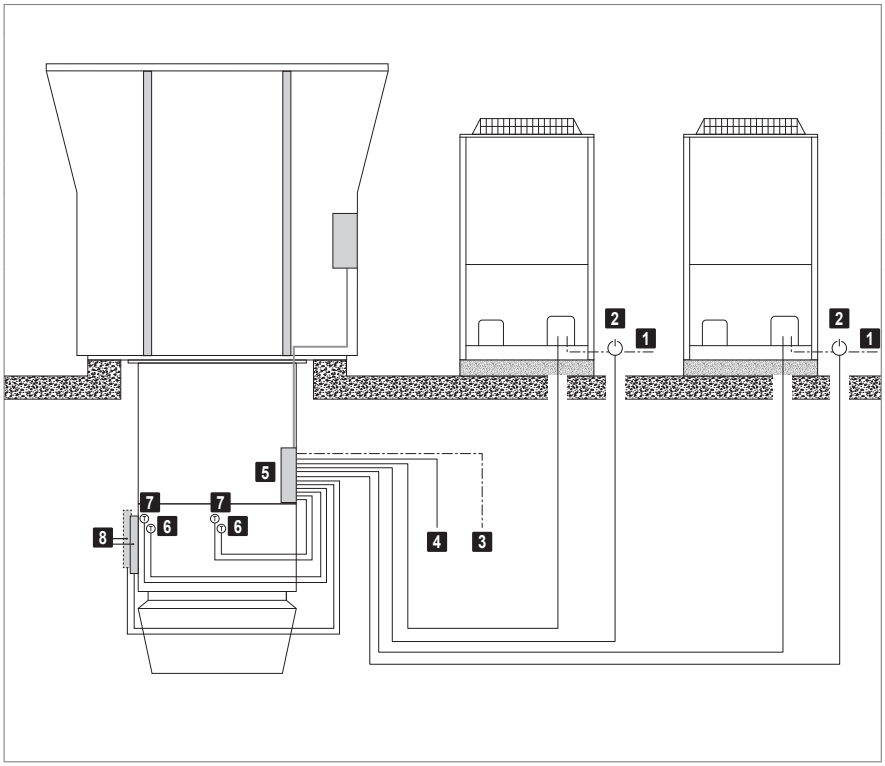
Electrical installation for RoofVent® RP with 1 heat pump system



1 Power supply for condensing unit
2 Condensing unit main switch with auxiliary contact (NO contact, provided by the client)
3 Power supply RoofVent®
4 Zone bus
5 Connection box
6 Liquid temperature sensor
7 Gas temperature sensor (supplied loose)
8 Expansion valve (supplied loose)

Fig. D17: On-site electrical connection of the heat pump system for RoofVent® RP-6…K, RP-9…K

Electrical installation for RoofVent® RP with 2 heat pump systems



1 Power supply for condensing unit
2 Condensing unit main switch with auxiliary contact (NO contact, provided by the client)
3 Power supply RoofVent®
4 Zone bus
5 Connection box
6 Liquid temperature sensor
7 Gas temperature sensor (supplied loose)
8 Expansion valve (supplied loose)

Fig. D18: On-site electrical connection of the heat pump system for RoofVent® RP-9-M

Component	Designation	Voltage	Cable		Comments
Zone control panel	Power supply	3 × 400 VAC	NYM-J	5 × … mm²	3-phase
		1 × 230 VAC	NYM-J	3 × … mm²	1-phase
	Zone bus		J-Y(St)Y	2 × 2 × 0.8 mm	max. 1000 m length
	System bus		Ethernet	≥ CAT 5	For connecting several zone control panels
	Integration into the building management system		Ethernet	≥ CAT 5	BACnet, Modbus IP
			J-Y(St)Y	2 × 2 × 0.8 mm	Modbus RTU
	Room temperature sensor		J-Y(St)Y	2 × 2 × 0.8 mm	Max. 250 m
	Fresh air temperature sensor		J-Y(St)Y	2 × 2 × 0.8 mm	Max. 250 m
	Additional room air temperature sensors		J-Y(St)Y	2 × 2 × 0.8 mm	Max. 250 m
	Combination sensor room air quality, temperature and humidity		J-Y(St)Y	4 × 2 × 0.8 mm	Max. 250 m
	Collective alarm	Volt-free max. 230 VAC max. 24 VDC	NYM-O	2 × 1.5 mm²	max. 3 A
	Power supply for units	3 × 400 VAC	NYM-J	5 × 1.5 mm² (min.)	RoofVent® units size 6
		3 × 400 VAC	NYM-J	5 × 4.0 mm² (min.)	RoofVent® units size 9
		3 × 400 VAC	NYM-J	5 × 1.5 mm² (min.)	TopVent® units
	Power supply for condensing unit	3 × 400 VAC	NYM-J	5 × 4.0 mm² (min.)	
	Power supply for electric heating coil	3 × 400 VAC	NYM-J	4 × 4.0 mm² (min.)	S type size 6, R type size 9
		3 × 400 VAC	NYM-J	4 × 10.0 mm² (min.)	S type size 9
	Heating demand	Volt-free max. 230 VAC max. 24 VDC	NYM-O	2 × 1.5 mm²	max. 6 A
	Setpoint heating demand	0-10 VDC	J-Y(St)Y	2 × 2 × 0.8 mm	Max. 250 m
	Fault heat supply	24 VAC	NYM-O	2 × 1.5 mm²	max. 1 A
	Distributor pump heat supply	3 × 400 VAC	NYM-J	4 × 1.5 mm² (min.)	Power supply 3-phase, max. 6 A
		1 × 230 VAC	NYM-J	3 × 1.5 mm² (min.)	Power supply 1-phase, max. 6 A
			NYM-O	4 × 1.5 mm²	Control line
	System operator terminal (if external)	24 VAC	NYM-J	3 × 1.5 mm²	Power supply, 1 A fusing
			Ethernet	≥ CAT 5	Communication
	Zone operator terminal (if external)	24 VAC	J-Y(St)Y	4 × 2 × 0.8 mm	Power supply, 1 A fusing, max. 250 m length
	External sensor values	0-10 VDC	J-Y(St)Y	2 × 2 × 0.8 mm	
	External set values	0-10 VDC	J-Y(St)Y	2 × 2 × 0.8 mm	
	Load shedding input	24 VAC	NYM-O	2 × 1.5 mm²	max. 1 A
	Operating selector switch on terminal (analogue)	0-10 VDC	J-Y(St)Y	2 × 2 × 0.8 mm	
	Operating selector switch on terminal (digital)	0-10 VDC	J-Y(St)Y	5 × 2 × 0.8 mm	
	Operating selector button on terminal	24 VAC	J-Y(St)Y	5 × 2 × 0.8 mm	
	Forced off	24 VAC	NYM-O	2 × 1.5 mm²	max. 1 A

Component	Designation	Voltage	Cable	Comments
RoofVent®	Power supply	3 × 400 VAC	NYM-J 5 × 1.5 mm² (min.)	RoofVent® units size 6
		3 × 400 VAC	NYM-J 5 × 4.0 mm² (min.)	RoofVent® units size 9
	Zone bus		J-Y(St)Y 2 × 2 × 0.8 mm	max. 1000 m length
	Forced off	24 VAC	NYM-O 2 × 1.5 mm²	max. 1 A
	Forced heating	24 VAC	NYM-J 2 × 1.5 mm²	max. 1 A
	Mixing valve heating	24 VAC	NYM-O 5 × 1.0 mm²	
	Heating pump	230 VAC	NYM-J 3 × 1.5 mm²	Power supply
		24 VAC	NYM-O 4 × 1.0 mm²	Control line
	Power supply for electric heating coil	3 × 400 VAC	NYM-J 4 × 4.0 mm² (min.)	S type size 6, R type size 9
		3 × 400 VAC	NYM-J 4 × 10.0 mm² (min.)	S type size 9
	Expansion valve		J-Y(St)Y 3 × 2 × 0.8 mm	2 × for RP-9-M, cable supplied
	Liquid temperature sensor		H05VV-F 2 × 0.75 mm²	2 × for RP-9-M, cable sensor supplied
	Gas temperature sensor		H05VV-F 2 × 0.75 mm²	2 × for RP-9-M, cable sensor supplied
Condensing unit (2 × for RP-9-M)	Power supply	3 × 400 VAC	NYM-J 5 × 4.0 mm² (min.)	
	Communication RoofVent®		J-Y(St)Y 4 × 2 × 0.8 mm	
Condensing unit main switch (2 × for RP-9-M)	Fault message		J-Y(St)Y 1 × 2 × 0.8 mm	Auxiliary contact signal (NO contact, provided by the client)

Table D6: Cable list for on-site connections

D

System design

1 Design example

Notice
Use the 'HK-Select' program to design Hoval Indoor Climate Systems.
You can download it free of charge on the Internet.

Design data		Example
■ Hall geometry (L × W × H) ■ Required fresh air flow rate ■ Internal heat gains (machines, lighting, etc.) ■ Heating and cooling with decentralised heat pump ■ Optimisation of the ventilation quality (no limitation on the number of units)		52 × 42 × 9 m 32000 m³/h 23 kW → Unit type RP → Unit size 6
Design conditions heating:	■ Fresh air temperature ■ Room temperature ■ Extract air conditions ■ Fabric heat losses	- 8 °C 20 °C 22 °C / 40 %rh 93 kW
Design conditions cooling:	■ Fresh air temperature ■ Room temperature ■ Extract air temperature ■ Transmission sensible gains	32 °C / 40 %rh 26°C 28°C 47 kW
Number of units ■ Calculate the required number of units: n = Fresh air flow rate / nominal air flow rate		n = 32000 / 5500 = 5.8 → 6 units (size 6)
Type of heating coil ■ Calculate the required output for coverage of fabric heat losses per unit: Q_{H_req} = (fabric heat losses – internal heat loads) / n ■ Use the 'Hoval HK-Select' selection program to calculate the output for coverage of fabric heat losses under the given design conditions and select the suitable coil type. – To ensure that the plate heat exchanger cannot freeze, calculate the output data in the 'with icing protection' mode. – To ensure that the condenser is not impaired by excessively low air intake temperatures, select supplementary heating with electric heating coil.		(93 – 23) / 6 = 11.7 kW per unit RP-6SK: 19.3 kW → Heating/cooling coil type K → Electric heating coil type S
Type of cooling coil ■ Calculate the required output for coverage of transmission sensible gains per unit: Q_{C_req} = (transmission sensible gains + internal heat loads) / n ■ Use the 'Hoval HK-Select' selection program to calculate the output for coverage of transmission sensible gains under the given design conditions and select the suitable coil type.		(47 + 23) / 6 = 11.7 kW per unit RP-6SK: 13.2 kW → Heating/cooling coil type K

Checks	
■ Effective air flow rate V_{eff} = Nominal air flow rate × n	5500 × 6 = 33000 m³/h 33000 m³/h > 32000 m³/h → OK
■ Effective heat output $Q_{H\_effective}$ = Output for coverage of fabric heat losses × n	19.3 × 6 = 115.8 kW 115.8 kW > (93 – 23) kW → OK
■ Mounting height Calculate the actual mounting height (= distance between the floor and the bottom edge of the unit) and compare with the minimum and maximum mounting height. Y = Hall height – length of below-roof unit	9000 – 2470 = 6530 mm Y_{min} = 4.0 m < 6.53 m → OK Y_{max} = 16.2 m > 6.53 m → OK
■ Effective cooling capacity $Q_{c\_effective}$ = Output for coverage of transmission sensible gains × n	13.2 × 6 = 79.2 kW 79.2 kW > (47 + 23) kW → OK
■ Floor area reached Compare the floor area reached with the base area of the hall (L × W). A = Floor area reached × n	480 × 6 = 2880 m² 52 × 42 = 2184 m² 2880 m² > 2184 m² → OK
■ Minimum and maximum clearances Determine the positioning of the units according to the number of units and the base area of the hall; check the minimum and maximum clearances.	n = 6 = 3 × 2 Unit clearance in length: X = 52 / 3 = 17.3 m X_{max} = 22.0 ≥ 17.3 m X_{min} = 11.0 ≤ 17.3 m → OK Unit clearance in width: X = 42 / 2 = 21.0 m X_{max} = 22.0 ≥ 21.0 m X_{min} = 11.0 ≤ 21.0 m → OK

2 Maintenance schedule

Activity	Interval
Changing the fresh air and extract air filter	When the filter alarm is displayed, at least annually
Comprehensively checking function; cleaning and possibly repairing the RoofVent® unit and the condensing unit	Annually by Hoval customer service

Table E1: Maintenance schedule

Project		Name	
Project No.		Function	
		Address	
		Tel.	
		Fax	
Date		E-mail	

Information about the hall

Application		Length	
Type		Width	
Insulation		Height	

Is the roof strong enough?	○ yes	○ no		
Are there window areas?	○ yes	○ no	Percentage?	
Is there a crane?	○ yes	○ no	Height?	
Is there enough space for installation and servicing?	○ yes	○ no		
Are there any voluminous installations or machines?	○ yes	○ no		
Are pollutants present?	○ yes	○ no	Which?	
– If yes, are they heavier than air?	○ yes	○ no		
Is oil contained in the extract air?	○ yes	○ no		
Is dust present?	○ yes	○ no	Dust level?	
Is there high humidity?	○ yes	○ no	How much?	
Is the air volume balanced?	○ yes	○ no		
Are local machine extractions required?	○ yes	○ no		
Are any conditions imposed by public authorities?	○ yes	○ no	Which?	
Are sound level requirements to be fulfilled?	○ yes	○ no	Which?	

Design data

Fresh air flow rate?		m³/h
Fresh air / hall area		m³/h per m²
Air change rate		
Internal heat gains (machines, ...)		kW
Heating and cooling		
Unit size		
Control zones		

Design conditions heating

■ Highest outside temperature and humidity		°C		%
■ Room temperature		°C		
■ Extract air temperature and humidity		°C		%
■ Fabric heat losses		kW		

Design conditions cooling

■ Highest outside temperature and humidity		°C		%
■ Room temperature		°C		
■ Extract air temperature and humidity		°C		%
■ Transmission sensible gains		kW		

Further information

Hoval quality.
You can count on us.

As a specialist in heating and air-conditioning technology, Hoval is your experienced partner for system solutions. For example, you can heat water with the sun's energy and the rooms with oil, gas, wood or a heat pump. Hoval ties together the various technologies and also integrates room ventilation into this system. You can be sure to save both energy and costs while protecting the environment.

Hoval is one of the leading international companies for indoor climate solutions. More than 70 years of experience continuously motivates us to design innovative system solutions. We export complete systems for heating, cooling and ventilation to more than 50 countries.

We take our responsibility for the environment seriously. Energy efficiency is at the heart of the heating and ventilation systems we design and develop.

Responsibility for energy and environment

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