



## RoofVent® RP

Supply and extract air handling unit with reversible heat pump system for heating and cooling high spaces

1 Use	2
2 Construction and operation	2
3 Technical data	7
4 Specification texts	16
5 System design	20
6 Unit type reference RoofVent® RP	24

## 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 with heat pump
- Cooling with heat pump
- 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

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.

#### Below-roof unit

The below-roof unit comprises the following components:

- Connection module
- Heating/cooling section
- Air-Injector

#### Heat pump system

The heat pump system consists of the following components:

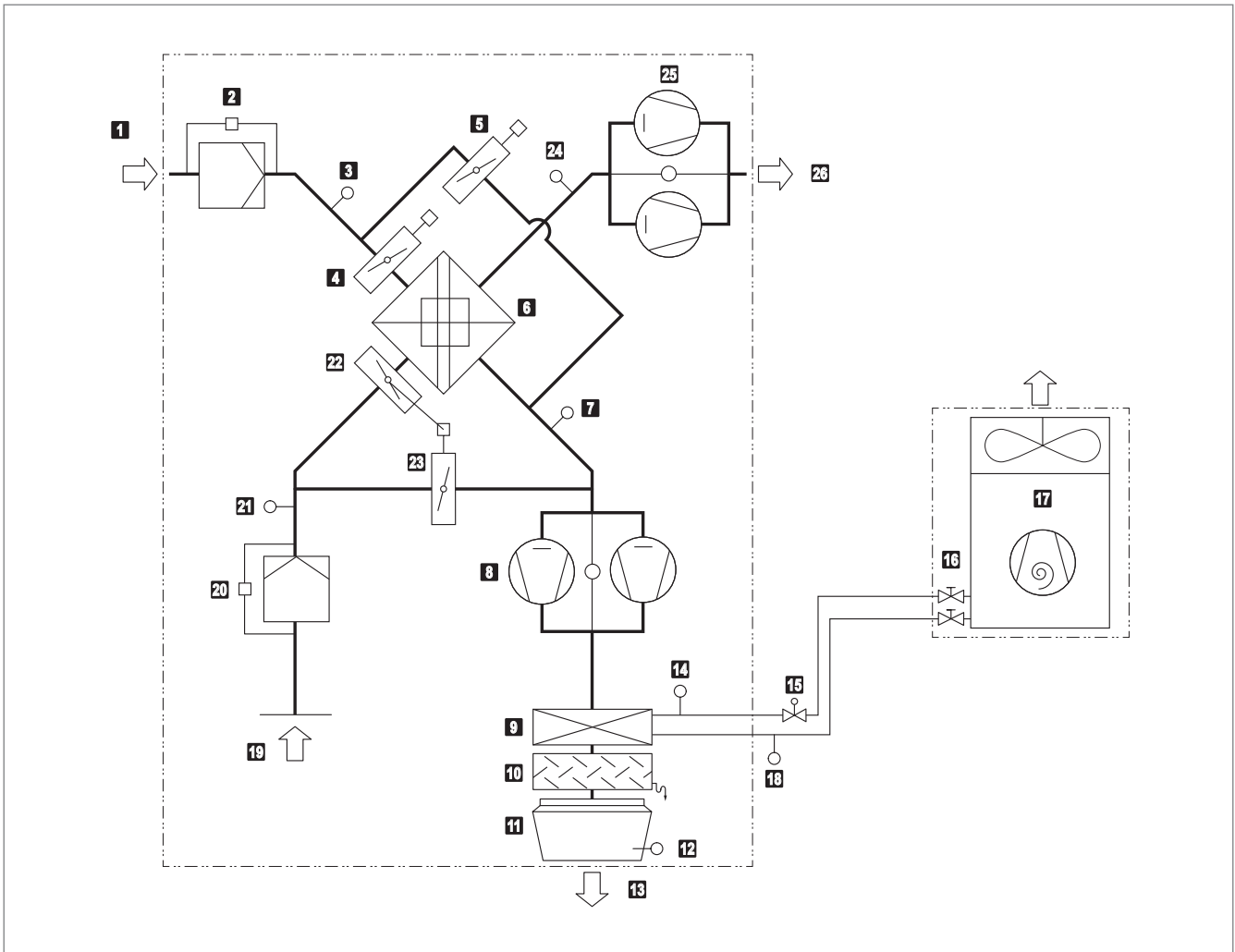
- Reversible condensing unit (1 or 2 pc.)
- Communication module
- Expansion valve



Fig. 1: RoofVent® RP

2.2 Function diagram

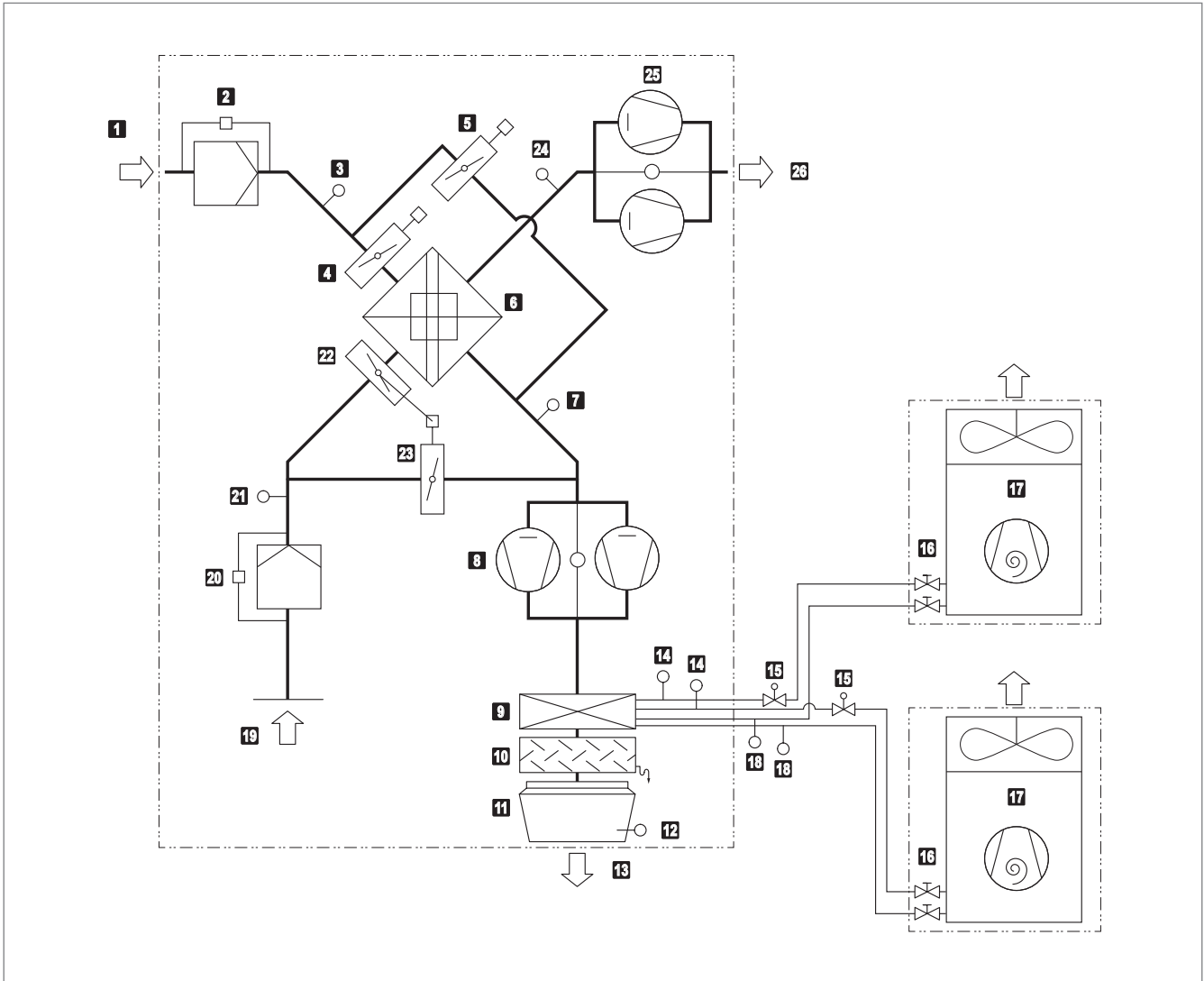
RoofVent® RP with 1 heat pump system



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

Table 1: Function diagram RoofVent® RP-6-K, RP-9-K (1 heat pump system)

RoofVent® RP with 2 heat pump systems



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

Table 2: Functional diagram RoofVent® RP-9-M (2 heat pump systems)

### 2.3 Operating modes

The RoofVent® RP has the following operating modes:

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

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.

<b>VE</b>	<p><b>Ventilation</b></p> <p>The unit blows fresh air into the room and exhausts polluted room air. The room temperature set value day is active.</p> <p>Depending on the temperature conditions, the system controls:</p> <ul style="list-style-type: none"> <li>■ the energy recovery</li> <li>■ the heating/cooling</li> <li>■ the supply air/exhaust air volume (between the adjustable minimum and maximum values)</li> </ul>	<p>Supply air fan ..... MAX</p> <p>Exhaust air fan ..... MAX</p> <p>Energy recovery ..... 0-100 %</p> <p>Extract air damper ..... open</p> <p>Recirculation damper ..... closed</p> <p>Heating/cooling ..... 0-100 %</p>
<b>VEL</b>	<p><b>Ventilation (reduced)</b></p> <p>As VE, but the unit only operates with the set minimum values for the supply and exhaust air volumes</p>	<p>Supply air fan ..... MIN</p> <p>Exhaust air fan ..... MIN</p> <p>Energy recovery ..... 0-100 %</p> <p>Extract air damper ..... open</p> <p>Recirculation damper ..... closed</p> <p>Heating/cooling ..... 0-100 %</p>
<b>AQ</b>	<p><b>Air quality</b></p> <p>This is the operating mode for demand-controlled ventilation of the room. The room temperature set value day is active. Depending on the current room air quality and temperature conditions, the system operates in one of the following operating states:</p>	
AQ_REC	<ul style="list-style-type: none"> <li>■ Air quality Recirculation: When air quality is good, the unit heats or cools in recirculation operation.</li> </ul>	Like REC
AQ_ECO	<ul style="list-style-type: none"> <li>■ 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.</li> </ul>	<p>Supply air fan ..... MIN-MAX</p> <p>Exhaust air fan ..... MIN-MAX</p> <p>Energy recovery ..... 0-100 %</p> <p>Extract air damper ..... 50 %</p> <p>Recirculation damper ..... 50 %</p> <p>Heating/cooling ..... 0-100 %</p>
AQ_VE	<ul style="list-style-type: none"> <li>■ 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.</li> </ul>	<p>Supply air fan ..... MIN-MAX</p> <p>Exhaust air fan ..... MIN-MAX</p> <p>Energy recovery ..... 0-100 %</p> <p>Extract air damper ..... open</p> <p>Recirculation damper ..... closed</p> <p>Heating/cooling ..... 0-100 %</p>

Code	Operating mode	Description
<b>REC</b>	<b>Recirculation</b> 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.	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
<b>EA</b>	<b>Exhaust air</b> 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
<b>SA</b>	<b>Supply air</b> 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
<b>ST</b>	<b>Standby</b> 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 ..... MAX Exhaust air fan ..... MAX Energy recovery ..... 0 % Extract air damper ..... open Recirculation damper ..... closed Heating/cooling ..... off
<b>L_OFF</b>	<b>Off (local operating mode)</b> 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

Table 3: Operating modes of the RoofVent® RP

### 3 Technical data

#### 3.1 Unit type reference

RP - 9 A K ...	
<b>Unit type</b>	RoofVent® RP
<b>Unit size</b>	6 or 9
<b>Heating section (option)</b>	- without heating section A with coil type A (hot water) R with coil type R (electric) S with coil type S (electric)
<b>Heating/cooling section</b>	K with coil type K (1 heat pump) M with coil type M (2 heat pumps)
<b>Further options</b>	

Table 4: Unit type reference

#### 3.2 Application limits

Fresh air temperature heating mode	min.	-20 °C	
	max.	15 °C	
Fresh air temperature cooling mode	min.	-5 °C	
	max.	43 °C	
Extract air temperature	max.	50 °C	
Extract air relative humidity <sup>1)</sup>	max.	60 %	
Moisture content of extract air <sup>1)</sup>	max.	12.5 g/kg	
Supply air temperature	max.	60 °C	
Air flow rate	Size 6:	min. 3100 m³/h	
	Size 9:	min. 5000 m³/h	
Condensate quantity	Size 6:	max. 90 kg/h	
	Size 9:	max. 150 kg/h	
The units cannot be used in:			
<ul style="list-style-type: none"> <li>■ Damp locations</li> <li>■ Rooms with mineral oil vapours in the air</li> <li>■ Rooms with a high salt content in the air</li> <li>■ Rooms with acidic or alkaline vapours in the air</li> </ul>			
<sup>1)</sup> Units for applications where the humidity in the room increases by more than 2 g/kg are available on request.			

Table 5: 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 6: Thermal transfer level of the plate heat exchanger

#### 3.4 Air filtration

Filter	Fresh air	Extract air
Class acc. to ISO 16890	ePM <sub>1</sub> 55 %	ePM <sub>10</sub> 65 %
Class acc. to EN 779	F7	M5
Energy classification Eurovent	A	D
Factory setting of differential pressure switches	250 Pa	250 Pa

Table 7: Air filtration

#### 3.5 Electrical connection

##### RoofVent® RP

Unit type		RP-6-K	RP-9-K RP-9-M
Supply voltage	V AC	3 x 400	3 x 400
Permitted voltage tolerance	%	± 5	± 5
Frequency	Hz	50	50
Connected load	kW	4.6	8.6
Current consumption max.	A	7.9	14.5
Series fuse	A	13.0	20.0

Table 8: RoofVent® RP electrical connections

##### Heat pump ERQ250

Unit type		RP-6-K RP-9-K	RP-9-M
Supply voltage	V AC	3 x 400	3 x 400
Permitted voltage tolerance	%	± 10	± 10
Frequency	Hz	50	50
Series fuse	A	25	2 x 25
Power consumption max.	kW	7.7	15.4
Current consumption max.	A	11.3	22.6
Inrush current	A	74.0	85.0

Table 9: Daikin ERQ250 heat pump 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 reached	m²	480	797		
Specific fan power SFP <sub>int</sub>	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	%	1.50	1.20	
<b>Heating/cooling section</b>			<b>K</b>	<b>K</b>	<b>M</b>
Nominal external pressure	Supply air	Pa	130	240	200
	Extract air	Pa	190	300	300
Effective electric power input	kW	2.1	3.3	3.4	

Table 10: RoofVent® RP technical data

### 3.7 Technical data of the heat pump

Rated heat output <sup>1)</sup>	kW	31.5
Rated cooling capacity <sup>2)</sup>	kW	28.0
COP value	–	4.09
EER value	–	3.77
Condensation temperature	°C	46.0
Evaporation temperature	°C	6.0
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 11: Daikin ERQ250 heat pump technical data



### 3.8 Heat output

Unit type	t <sub>F</sub>	Q	Q <sub>TG</sub>	H <sub>max</sub>	t <sub>S</sub>	P <sub>HP</sub>
	°C	kW	kW	m	°C	kW
RP-6-K	-5	27.6	20.6	14.6	29.1	8.3
	-15	22.3	11.1	20.0	24.0	6.8
RP-9-K	-5	27.6	18.1	19.4	24.7	8.3
	-15	22.3	6.9	31.5	20.6	7.0
RP-9-M	-5	55.2	45.7	12.2	35.0	16.6
	-15	44.5	29.1	15.3	28.8	13.9

Legend: t<sub>F</sub> = Fresh air temperature      H<sub>max</sub> = Maximum mounting height  
 Q = Heat output      t<sub>S</sub> = Supply air temperature  
 Q<sub>TG</sub> = Output to cover fabric heat losses      P<sub>HP</sub> = Power consumption of the heat pump(s)

Reference: Room air 18 °C, extract air 20 °C / 20 % rel. humidity

Table 12: RoofVent® RP heat output



**Notice**

The output for coverage of the fabric heat losses (Q<sub>TG</sub>) allows for the ventilation heat requirement (Q<sub>V</sub>) and the energy recovery output (Q<sub>ER</sub>) under the respective air conditions. The following applies:

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

### 3.9 Cooling capacities

Unit type	t <sub>F</sub>	RH <sub>F</sub>	Q <sub>sen</sub>	Q <sub>tot</sub>	Q <sub>TG</sub>	t <sub>S</sub>	m <sub>C</sub>	P <sub>HP</sub>
	°C	%	kW	kW	kW	°C	kg/h	kW
RP-6-K	28	40	16.5	24.4	11.6	16.0	9.6	4.8
		60	13.6	30.2	8.7	17.6	19.3	6.5
	32	40	18.6	29.4	13.7	18.9	14.8	7.1
		60	12.3	30.4	7.4	22.3	25.1	7.2
RP-9-K	28	40	16.8	24.4	9.8	18.6	10.4	4.8
		60	14.6	30.2	7.6	19.4	21.5	6.5
	32	40	18.3	29.4	11.3	22.1	15.1	7.1
		60	12.2	30.4	0.0	24.4	25.3	7.2
RP-9-M	28	40	30.8	48.7	23.8	13.4	16.7	4.8
		60	25.4	60.4	18.4	15.5	36.0	6.5
	32	40	35.7	58.8	28.7	15.6	27.0	7.1
		60	25.3	60.8	18.3	19.5	49.2	7.2

Legend: t<sub>F</sub> = Fresh air temperature      Q<sub>TG</sub> = Output for coverage of transmission sensible gains (→ sensible cooling load)  
 RH<sub>F</sub> = Relative humidity of the fresh air      t<sub>S</sub> = Supply air temperature  
 Q<sub>sen</sub> = Sensible cooling capacity      m<sub>C</sub> = Condensate quantity  
 Q<sub>tot</sub> = Total cooling capacity      P<sub>HP</sub> = Power consumption of the heat pump(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 13: RoofVent® RP cooling capacities



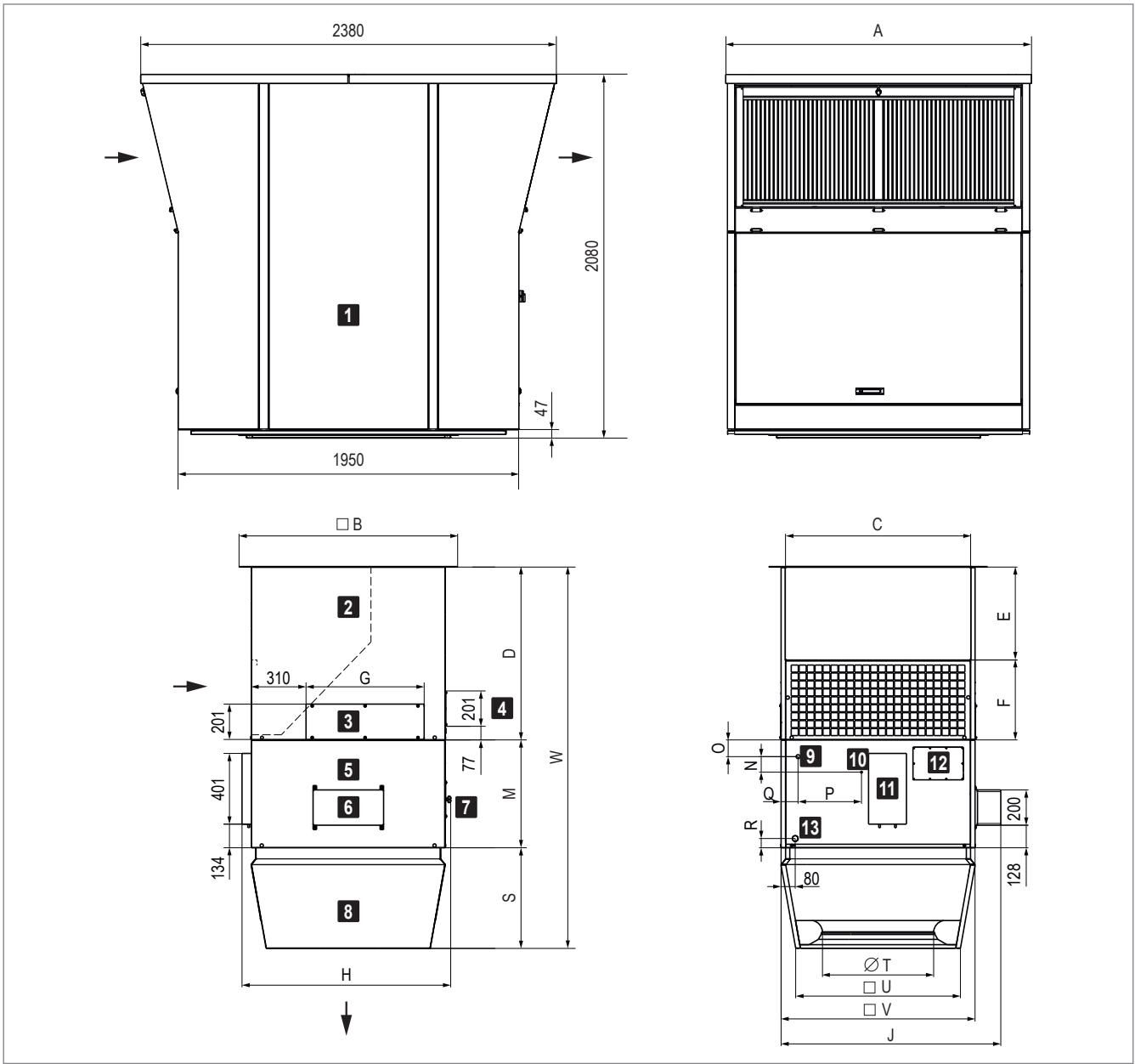
**Notice**

The output for coverage of transmission sensible gains (Q<sub>TG</sub>) allows for the ventilation cooling requirement (Q<sub>V</sub>) and the output of the energy recovery (Q<sub>ER</sub>) 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
- 2** Connection module
- 3** Access panel, coil
- 4** Access panel, connection box
- 5** Heating/cooling section
- 6** Communication module
- 7** Access panel, condensate separator

- 8** Air-Injector
- 9** Gas line connection (∅ 22.2 mm)
- 10** Liquid line connection (∅ 9.5 mm)
- 11** Expansion valve
- 12** Access panel, liquid temperature sensor
- 13** Condensate connection (G1" external)

Fig. 2: Dimensional drawing for RoofVent® RP-6-K, RP-9-K (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			
J	mm	1046				1246			
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 14: Dimensions of the RoofVent® RP

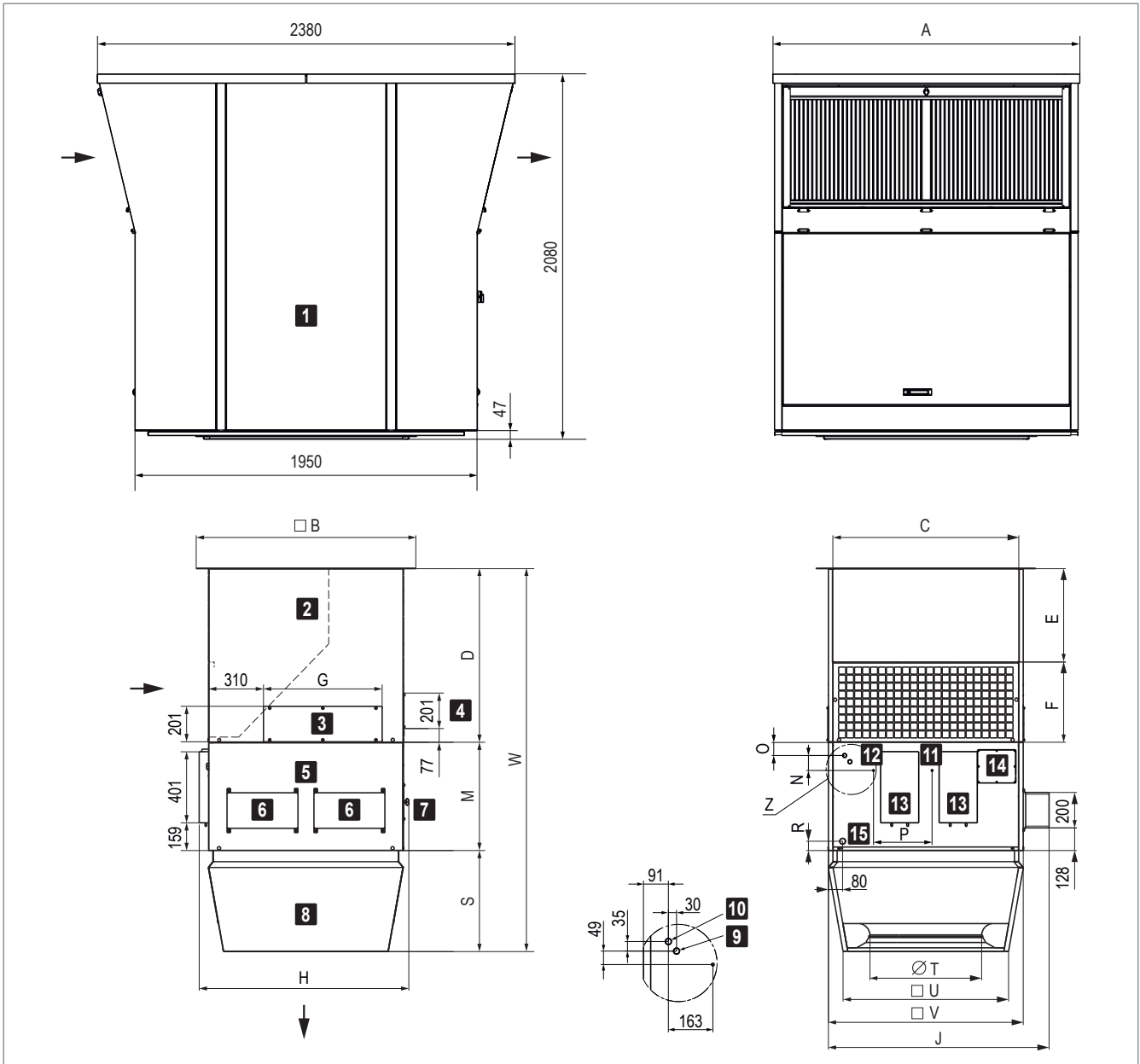
Unit type		RP-6-K	RP-9-K
N	mm	68	88
O	mm	123	95
P	mm	254	360
Q	mm	71	96
R	mm	54	53

Table 15: Dimensions for hydraulic connection

Unit type		RP-6-K	RP-9-K
<b>Total</b>	<b>kg</b>	<b>889</b>	<b>1151</b>
Roof unit	kg	700	900
Below-roof unit	kg	189	251
Air-Injector	kg	37	56
Heating/cooling section	kg	70	94
Communication module	kg	4	4
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 16: Weights of the RoofVent® RP

RoofVent® RP with 2 heat pump systems



- 1** Roof unit with energy recovery
- 2** Connection module
- 3** Access panel, coil
- 4** Access panel, connection box
- 5** Heating/cooling section
- 6** Communication module
- 7** Access panel, condensate separator
- 8** Air-Injector

- 9** Gas line connection – circuit 1 (∅ 22.2 mm)
- 10** Gas line connection – circuit 2 (∅ 22.2 mm)
- 11** Liquid line connection – circuit 1 (∅ 9.5 mm)
- 12** Liquid line connection – circuit 2 (∅ 9.5 mm)
- 13** Expansion valve
- 14** Access panel, liquid temperature sensor
- 15** Condensate connection (G1" external)

Fig. 3: Dimensional drawing for RoofVent® RP-9-M (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			
J	mm	1246			
Connection module		V0	V1	V2	V3
D	mm	980	1230	1480	1980
E	mm	530	780	1030	1530
W	mm	2160	2410	2660	3160

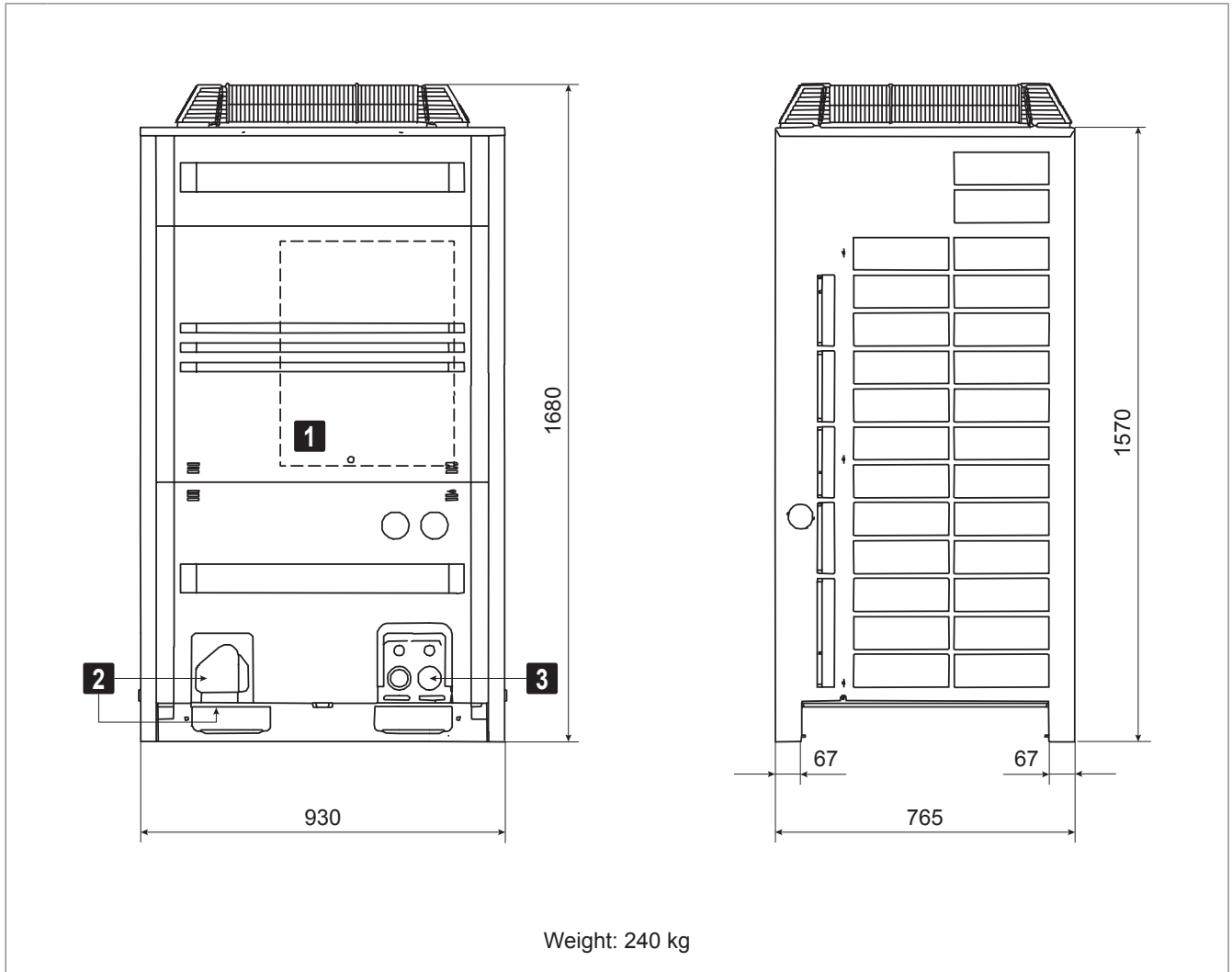
Table 17: Dimensions of the RoofVent® RP

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

Table 18: Dimensions for hydraulic connection

Unit type		RP-9-M
<b>Total</b>	<b>kg</b>	<b>1174</b>
Roof unit	kg	900
Below-roof unit	kg	274
Air-Injector	kg	56
Heating/cooling section	kg	110
Communication module	kg	8
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 19: Weights of the RoofVent® RP



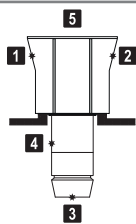
- 1** Electrical connection box
- 2** Working medium circuit connection (front or bottom)
- 3** Cable feedthroughs

Table 20: Dimensions and weights of the Daikin ERQ250 heat pump

3.11 Sound data

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

1) with hemispherical radiation in a low-reflection environment



- 1 Fresh air
- 2 Exhaust air
- 3 Supply air
- 4 Extract air
- 5 Outdoors (roof unit)

Table 21: RoofVent® RP sound data

Heat pump ERQ250	Sound pressure level (at a distance of 5 m) <sup>1)</sup>	dB(A)	58	
	Sound power level <sup>2)</sup>	dB(A)	78	
	Octave sound power level	63 Hz	dB(A)	79
		125 Hz	dB(A)	84
		250 Hz	dB(A)	80
		500 Hz	dB(A)	77
		1000 Hz	dB(A)	73
		2000 Hz	dB(A)	66
4000 Hz	dB(A)	60		
8000 Hz	dB(A)	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.



**Note**  
 The values are increased by 3 dB for 2 heat pumps.

Table 22: Daikin ERQ250 heat pump sound data

## 4 Specification texts

### 4.1 RoofVent® RP

Supply and extract air handling unit with reversible heat pump system for heating and cooling high spaces.

The unit consists of the following components:

- Roof unit with energy recovery
- Below-roof unit:
  - Connection module
  - Supplementary heating (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.

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#### Roof unit with energy recovery

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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 closed-pore polyurethane
- 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, class F7 (ePM<sub>10</sub>, 55 %), fully incinerable, easy to change, including differential pressure switch for filter monitoring.

#### Extract air filter:

Designed as highly efficient compact filter elements, class M5 (ePM<sub>10</sub>, 65 %), fully incinerable, easy to change, including differential pressure switch for filter monitoring.

#### Plate heat exchanger:

Cross-flow 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 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)
  - Pluggable wiring to the control box in the connection module



- High-voltage section:
  - Mains power terminals
  - Main switch (can be operated from the outside)
  - Button for stopping the fans during filter change
  - Fuses for the transformer
- Low-voltage section:
  - Transformer for actuators, sensors and the unit controller
  - Externally selectable emergency operation
  - Externally switchable forced off

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#### Connection module

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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 (ready-to-connect)
  - Optional components as required

CONNECTION MODULE V1 / V2 / V3:

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

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#### Heating/cooling section

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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 isolated 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)

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#### Air-Injector

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1 AIR-INJECTOR

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally isolated 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

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 isolated 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.

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#### Heat pump system

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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. For on-site installation on the side of the heating/cooling section.

#### 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.

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#### Condensing unit options

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#### 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.

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#### Options for the unit

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#### Supplementary heater with electric 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 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, insertion loss \_\_\_\_\_ dB

#### Exhaust 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 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 \_\_\_\_\_ 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 systems**

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 50 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
- 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 coil (only for option of supplementary heater with electric 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)

## 5 System design

### Transport of the heat pump:

- Lifting the unit with a crane:
  - Use 2 straps at least 8 m in length.
- Lifting the 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.

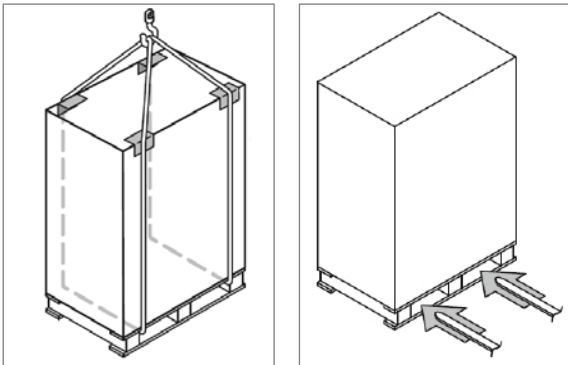


Fig. 4: Lifting the heat pump

### Installation of the heat pump:

- Make sure that the air inlet and outlet are not in the direction of the prevailing wind. If necessary, use a wind shield to protect the heat pump (option).
- Protect the heat pump against heavy snow fall.
- Install the heat pump on a level base with an adequate load bearing capacity so as to avoid vibration and noise.
- Install the heat pump on a solid base at least 150 mm tall (steel frame or concrete).

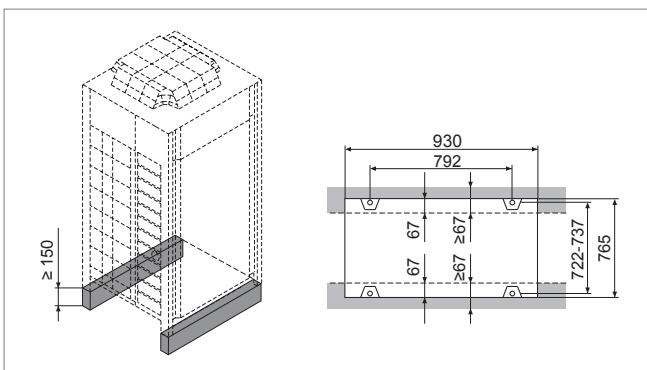


Fig. 5: Base for heat pump

- If the heat pump is mounted on a frame: attach a waterproof plate about 150 mm underneath the unit to prevent water penetrating the unit from below.
- Make sure that the heat pump is not damaged by pooling water or ice formation:
  - Create a condensate drain.
  - Provide heating for the condensate drain.

### Refrigerant pipes

- Connections on the heat pump
  - Left, front or right
- Diameter:
  - Liquid line .....9.5 mm
  - Gas line (suction gas).....22.2 mm
- Material:
  - Liquid line: annealed copper
  - Gas line (suction gas): semi-hard copper

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

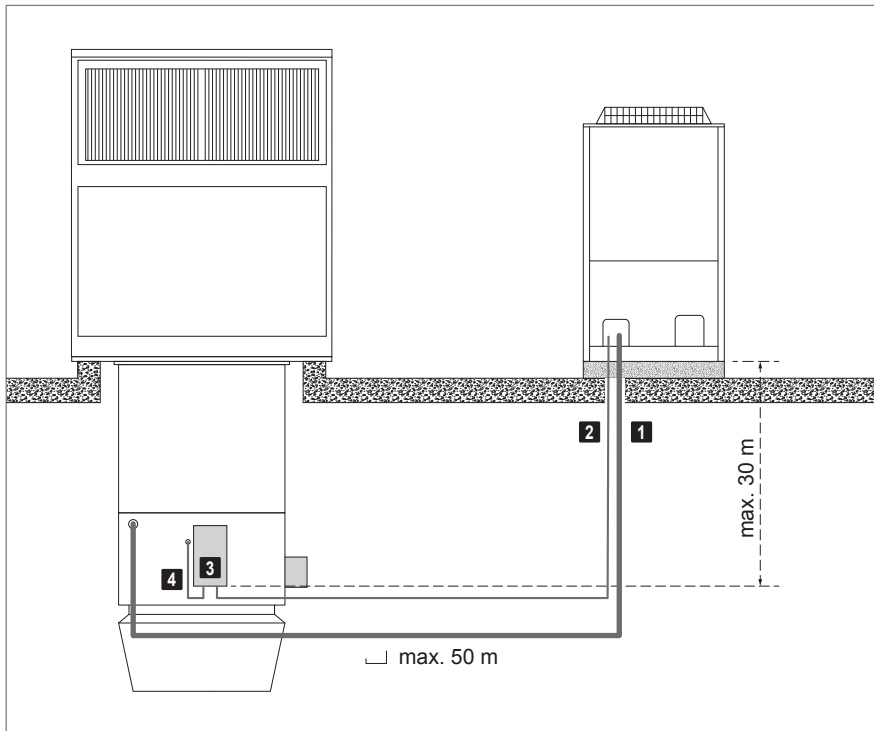
To avoid damaging the unit:

- 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.

### Filling with refrigerant

- The heat pump 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. As a result, it is essential to fill it in the liquid state. The composition can vary in the gaseous state.

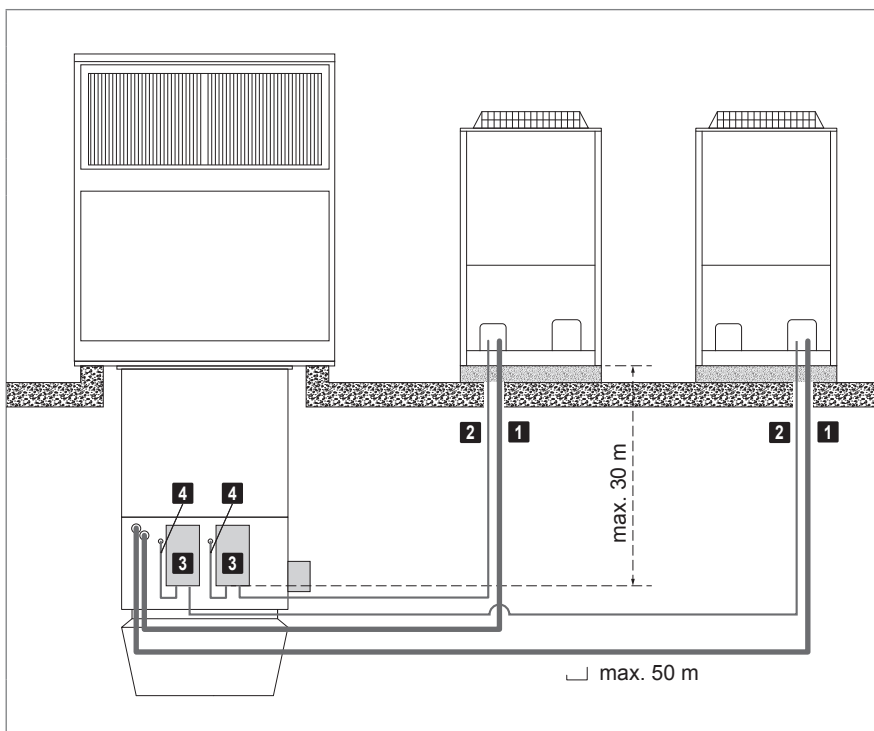
Refrigerant pipes for RoofVent® RP with 1 heat pump system



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

Table 23: Refrigerant pipes to be installed on site for RoofVent® RP-6-K, RP-9-K

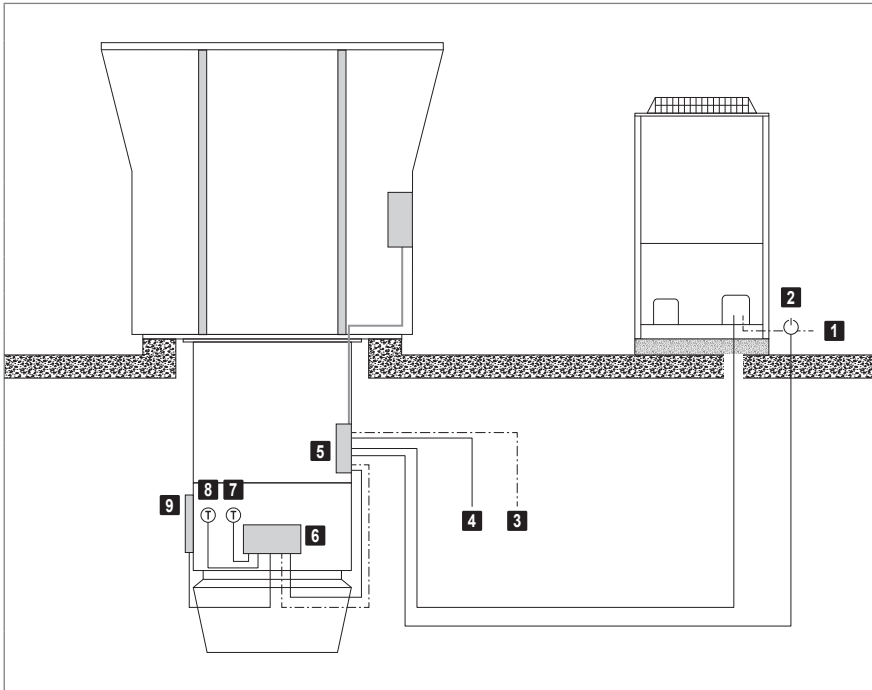
Refrigerant pipes for RoofVent® RP with 2 heat pump systems



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

Table 24: Refrigerant pipes to be installed on site for RoofVent® RP-9-M

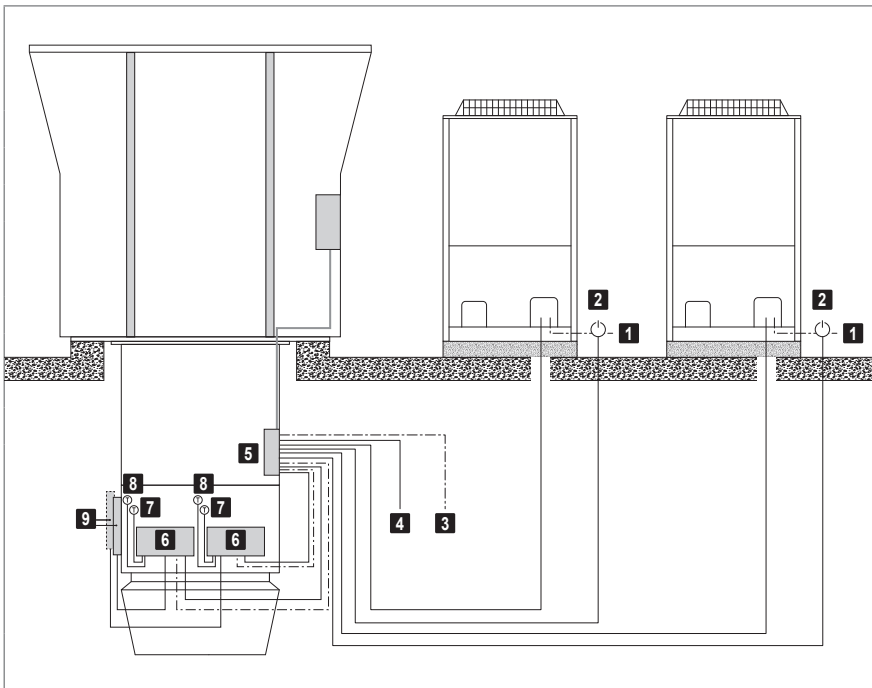
Electrical installation for RoofVent® RP with 1 heat pump system



- |   |   |
|---|---|
| 1 | Power supply heat pump  |
| 2 | Heat pump main switch with auxiliary contact (NO contact, provided by the client) |
| 3 | Power supply RoofVent®  |
| 4 | Zone bus  |
| 5 | Connection box  |
| 6 | Communication module (supplied loose)   |
| 7 | Liquid temperature sensor   |
| 8 | Gas temperature sensor (supplied loose)   |
| 9 | Expansion valve (supplied loose)  |

Table 25: 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 heat pump  |
| 2 | Heat pump main switch with auxiliary contact (NO contact, provided by the client) |
| 3 | Power supply RoofVent®  |
| 4 | Zone bus  |
| 5 | Connection box  |
| 6 | Communication module (supplied loose)   |
| 7 | Liquid temperature sensor   |
| 8 | Gas temperature sensor (supplied loose)   |
| 9 | Expansion valve (supplied loose)  |

Table 26: Electrical connection of the heat pump systems for RoofVent® RP-9-M

Plug connections prepared at the factory:

- Communication module (power supply and communication RoofVent®)
- Supply air sensor
- Actuator Air-Injector
- Condensate pump (option)

Component	Designation	Voltage	Cable	Comments
Zone control panel	Power supply	3 × 400 V AC	NYM-J 5 × ... mm <sup>2</sup>	3-phase
		1 × 230 V AC	NYM-J 3 × ... mm <sup>2</sup>	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 temp. sensor		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 V AC max. 24 VDC	NYM-O 2 × 1.5 mm <sup>2</sup>	max. 3 A
	Power supply for units	3 × 400 V AC	NYM-J 5 × 1.5 mm <sup>2</sup> (min.)	RoofVent® units size 6
		3 × 400 V AC	NYM-J 5 × 4.0 mm <sup>2</sup> (min.)	RoofVent® units size 9
		3 × 400 V AC	NYM-J 5 × 1.5 mm <sup>2</sup> (min.)	TopVent® units
	Power supply for heat pump	3 × 400 V AC	NYM-J 5 × 4.0 mm <sup>2</sup> (min.)	
	Power supply for electric coils	3 × 400 V AC	NYM-J 4 × 4.0 mm <sup>2</sup> (min.)	S type size 6, R type size 9
		3 × 400 V AC	NYM-J 4 × 10.0 mm <sup>2</sup> (min.)	S type size 9
	System operator terminal (if external)	24 V AC	NYM-J 3 × 1.5 mm <sup>2</sup>	Power supply, 1 A fusing
			Ethernet ≥ CAT 5	Communication
	Zone operator terminal (if external)	24 V AC	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 V AC	NYM-O 2 × 1.5 mm <sup>2</sup>	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 V AC	J-Y(ST)Y 5 × 2 × 0.8 mm	
	Forced off	24 V AC	NYM-O 2 × 1.5 mm <sup>2</sup>	max. 1 A
RoofVent®	Power supply	3 × 400 V AC	NYM-J 5 × 1.5 mm <sup>2</sup> (min.)	RoofVent® units size 6
		3 × 400 V AC	NYM-J 5 × 4.0 mm <sup>2</sup> (min.)	RoofVent® units size 9
	Zone bus		J-Y(ST)Y 2 × 2 × 0.8 mm	max. 1000 m length
	Forced off	24 V AC	NYM-O 2 × 1.5 mm <sup>2</sup>	max. 1 A
Communication module (2 × for RP-9-M)	Power supply	1 × 230 V AC	NYM-J 3 × 1.5 mm <sup>2</sup>	From the RoofVent® connection box Cable supplied
	Communication RoofVent®		J-Y(ST)Y 6 × 2 × 0.8 mm	Cable supplied
	Expansion valve		J-Y(ST)Y 3 × 2 × 0.8 mm	Cable supplied
	Liquid temperature sensor		H05VV-F 2 × 0.75 mm <sup>2</sup>	Cable sensor supplied
	Gas temperature sensor		H05VV-F 2 × 0.75 mm <sup>2</sup>	Cable sensor supplied
Heat pump (2 × for RP-9-M)	Power supply	3 × 400 V AC	NYM-J 5 × 4.0 mm <sup>2</sup> (min.)	
	Communication RoofVent®		J-Y(ST)Y 4 × 2 × 0.8 mm	
Heat pump main switch (2 × for RP-9-M)	Communication RoofVent®		J-Y(ST)Y 1 × 2 × 0.8 mm	Auxiliary contact signal (NO contact, provided by the client)

Table 27: Cable list for on-site connections

## 6 Unit type reference RoofVent® RP

RP - 6 B 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

### Reserve

### 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
- A- Fresh air silencer
- F Exhaust air silencer
- AF Fresh air and exhaust air silencer

### Silencer inside

- without
- SI Supply air and extract air silencer

### 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