

# Hoval Indoor Climate Systems TopVent® TP

**Recirculation units with efficient air distribution  
for heating and cooling with decentralised heat pump**

Design Handbook



**Hoval**

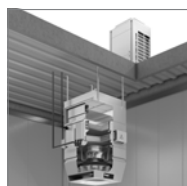




## Indoor Climate Systems

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Efficient. Flexible. Reliable.



## TopVent® TP

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Recirculation units with efficient air distribution  
for heating and cooling with decentralised heat pump



## Options

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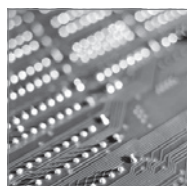
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## Control systems

Hoval TopTronic® C

→ see 'Control Systems for Hoval Indoor Climate Systems' manual





## Hoval Indoor Climate Systems

Efficient. Flexible. Reliable.

A



## 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

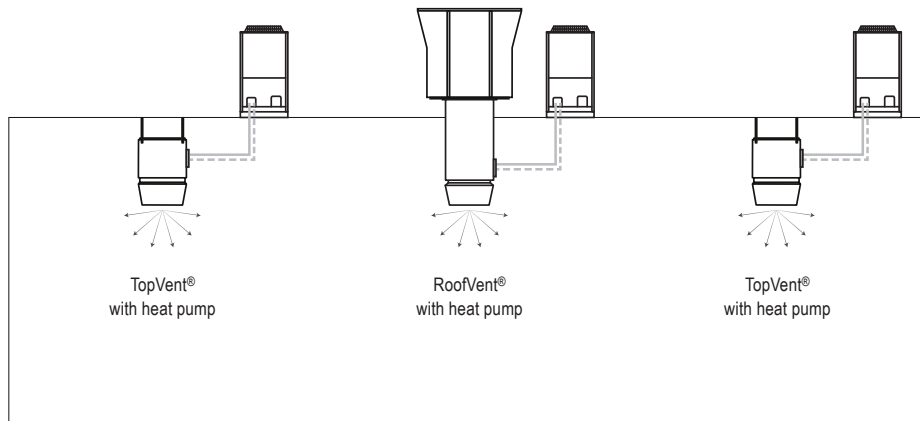
The TopTronic® C control system, which was specifically developed for Hoval indoor climate systems, regulates the separate units individually and controls them based on zones. This enables optimal adjustment to the local requirements of the different usage areas in the building. The patented control 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.

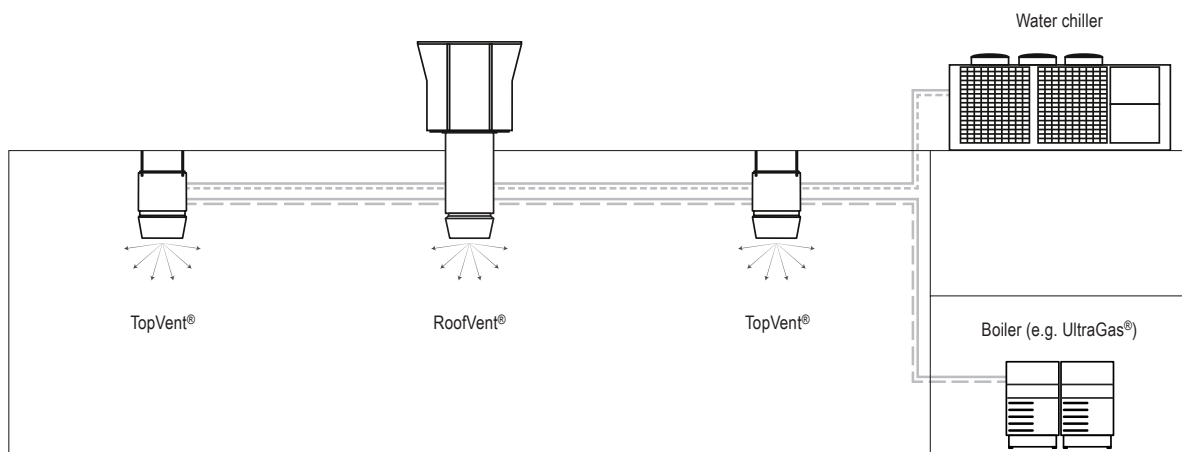
### Competent and reliable

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.

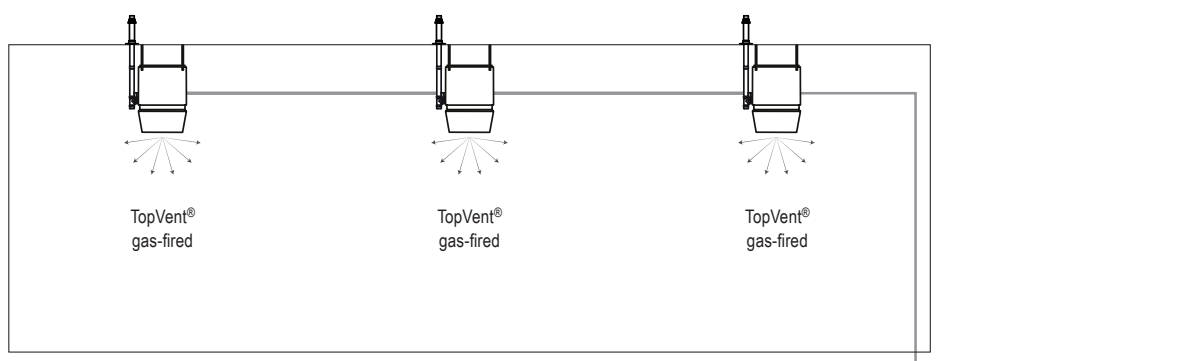
## System with decentralised heat and cold generation with heat pump



## System with central heat and cold generation



## System with decentralised heat generation with gas-fired heat exchanger







**TopVent® TP**

Recirculation units with efficient air distribution  
for heating and cooling with decentralised heat pump

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## 1 Use

### 1.1 Intended use

TopVent® TP units are recirculation units intended for heating and cooling high spaces. They have the following functions:

- 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)
- Recirculation operation
- Air filtration (option)
- Air distribution with adjustable Air-Injector

TopVent® TP 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 TopVent® TP unit consists of the following components:

#### Recirculation unit:

- Filter box (option):  
To filter the recirculation air
- 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 (with fan, condenser/evaporator and integrated condensate separator for the condensate generated)
- Air-Injector:  
Patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area

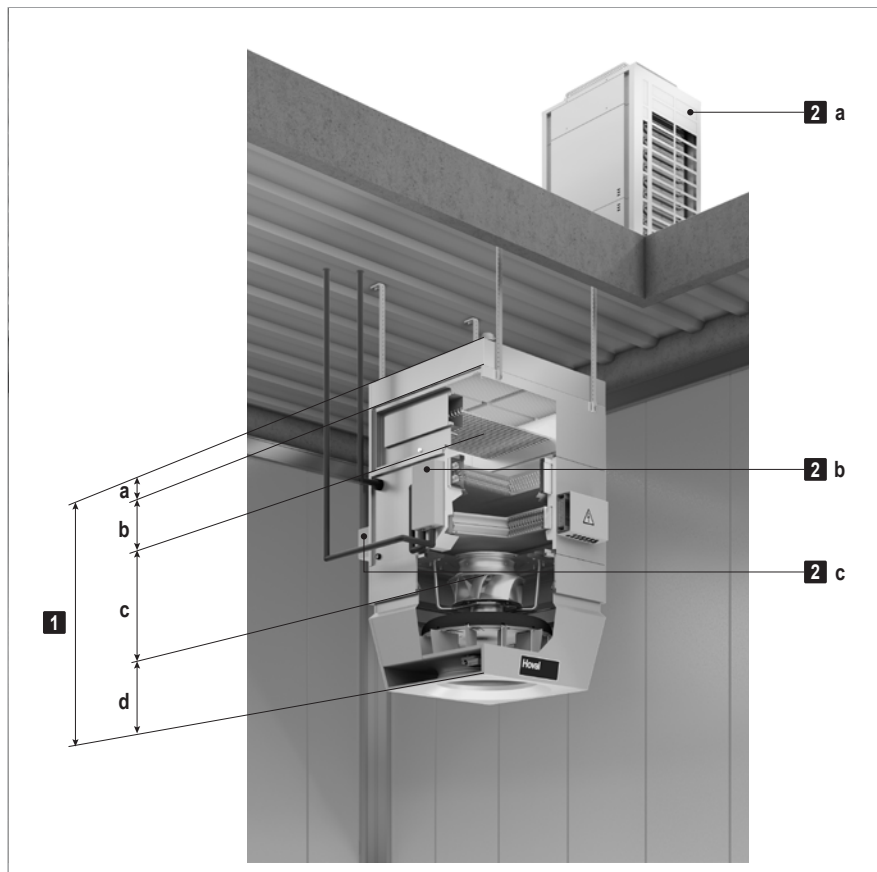
As part of the TopTronic® C control system, the unit control box is an integral component of the recirculation unit. The following components are installed:

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

#### Heat pump system

The heat pump system consists of the following components:

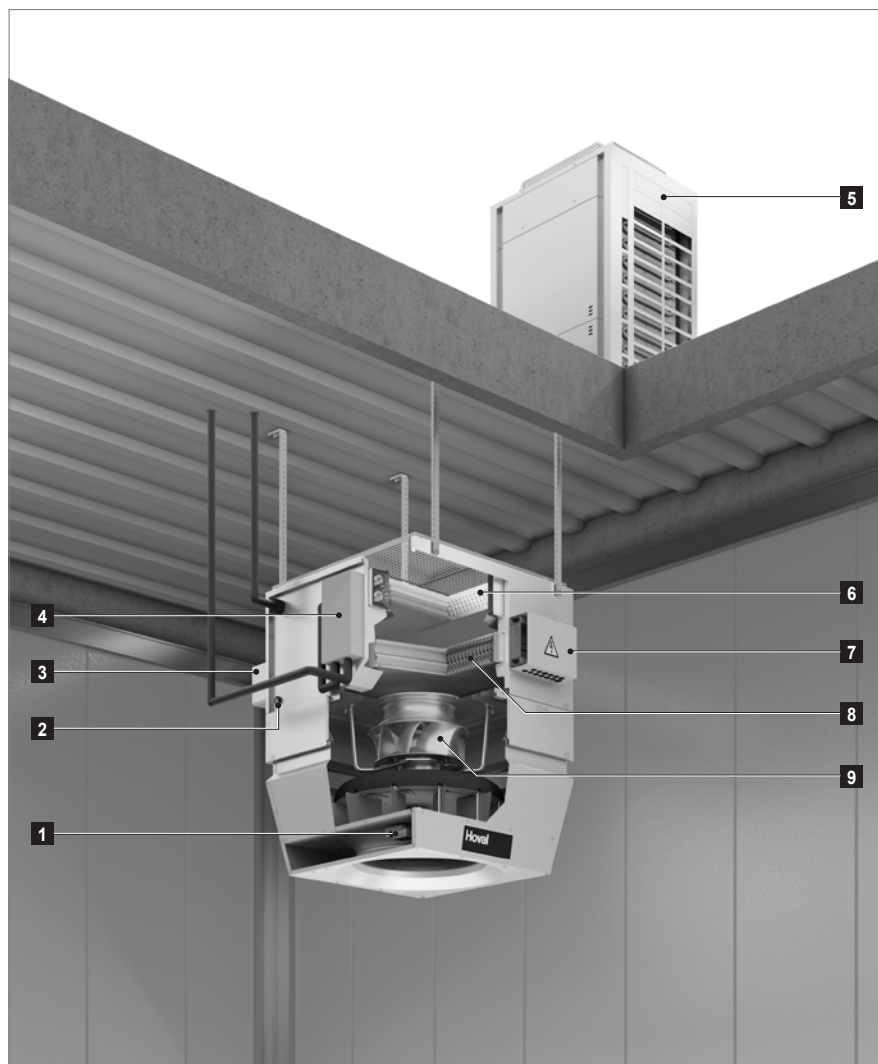
- Reversible condensing unit
- Communication module
- Expansion valve



- 1** Recirculation unit
  - a** Flat filter box (option)
  - b** Supplementary heater (option)
  - c** Heating/cooling section
  - d** Air-Injector
- 2** Heat pump system
  - a** Reversible condensing unit
  - b** Expansion valve
  - c** Communication module

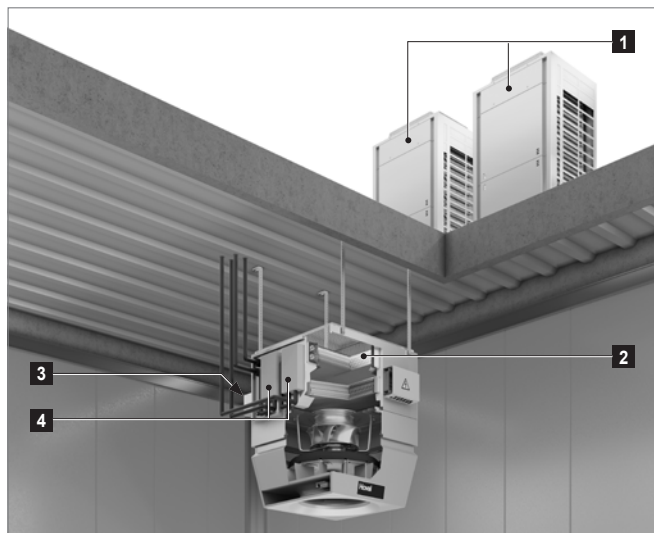
Fig. B1: TopVent® TP components

## 2.2 Construction variants



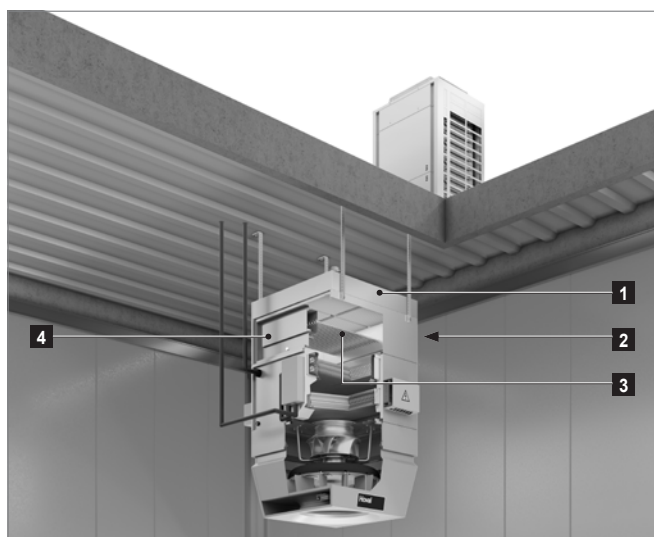
- |   |                       |
|---|-----------------------|
| 1 | Actuator Air-Injector |
| 2 | Condensate connection |
| 3 | Communication module  |
| 4 | Expansion valve       |
| 5 | Condensing unit       |
| 6 | Condenser/evaporator  |
| 7 | Unit control box      |
| 8 | Condensate separator  |
| 9 | Fan                   |

Fig. B2: TopVent® TP with 1 heat pump system



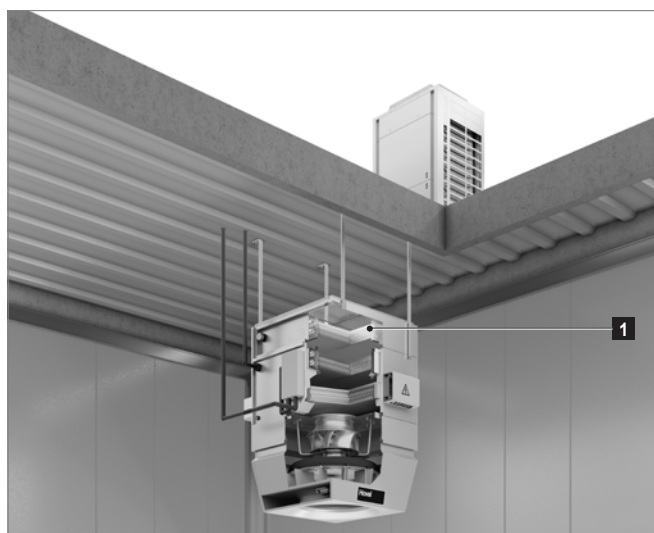
- 1 2 condensing units
- 2 Condenser/evaporator with 2 circuits
- 3 2 communication modules
- 4 2 expansion valves

Fig. B3: TopVent® TP with 2 heat pump systems



- 1 Flat filter box
- 2 Access panel, electric heating coil connection
- 3 Electric heating coil
- 4 Access panel, electric heating coil

Fig. B4: Topvent® TP with supplementary heater (electric heating coil)

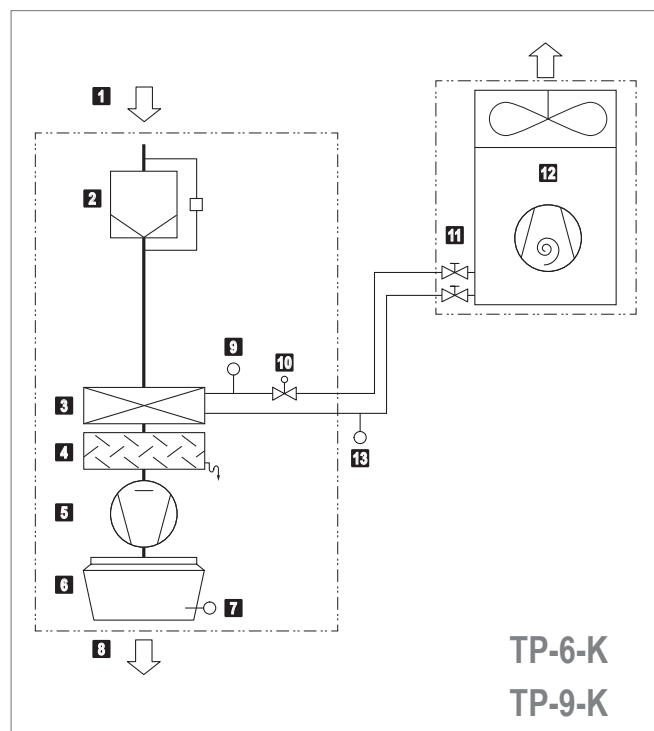


- 1 Heating coil (hot water)

Fig. B5: Topvent® TP with supplementary heater (hot water)

## 2.3 Function diagrams

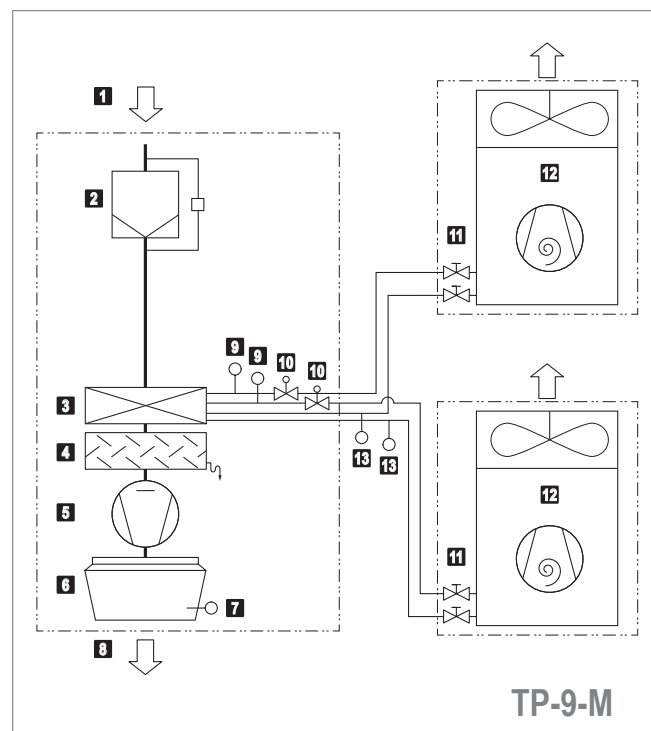
TopVent® TP with 1 heat pump system



- |    |   |
|----|---|
| 1  | Extract air   |
| 2  | Air filter with differential pressure switch (optional) |
| 3  | Heating/cooling coil                                    |
| 4  | Condensate separator                                    |
| 5  | Fan   |
| 6  | Air-Injector with actuator                              |
| 7  | Supply air temperature sensor                           |
| 8  | Supply air  |
| 9  | Liquid temperature sensor                               |
| 10 | Expansion valve   |
| 11 | Shut-off valves   |
| 12 | Condensing unit   |
| 13 | Gas temperature sensor (supplied loose)                 |

Table B1: TopVent® TP-6-K, TP-9-K function diagram

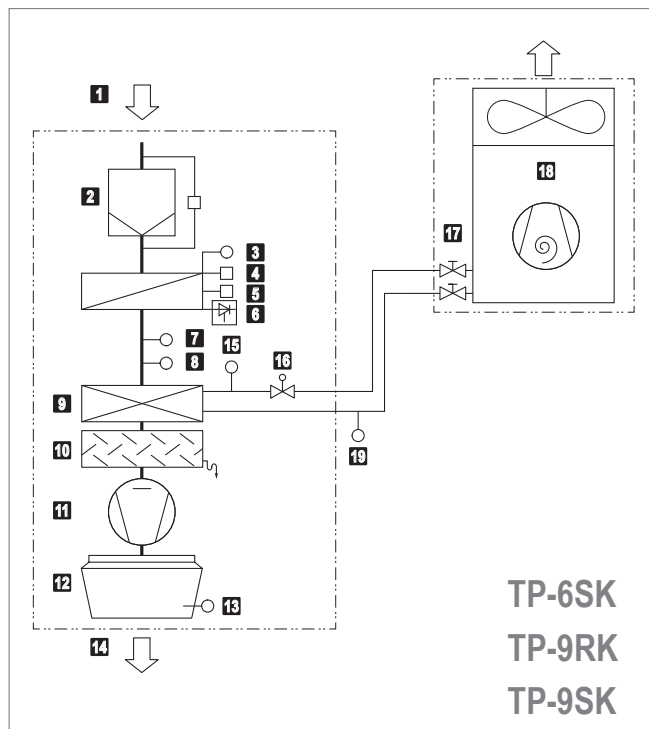
TopVent® TP with 2 heat pump systems



- |    |   |
|----|---|
| 1  | Extract air   |
| 2  | Air filter with differential pressure switch (optional) |
| 3  | Heating/cooling coil                                    |
| 4  | Condensate separator                                    |
| 5  | Fan   |
| 6  | Air-Injector with actuator                              |
| 7  | Supply air temperature sensor                           |
| 8  | Supply air  |
| 9  | Liquid temperature sensor                               |
| 10 | Expansion valve   |
| 11 | Shut-off valves   |
| 12 | Condensing unit   |
| 13 | Gas temperature sensor (supplied loose)                 |

Table B2: TopVent® TP-9-M function diagram

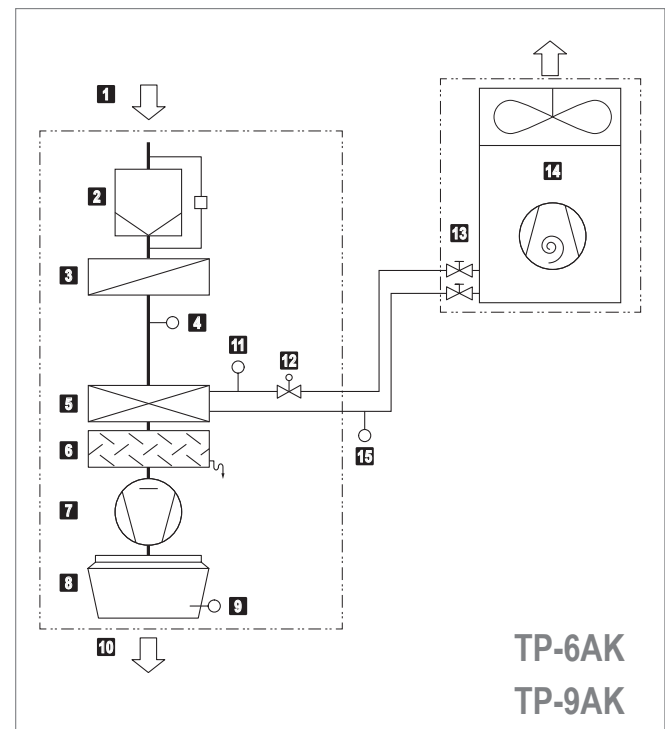
Topvent® TP with supplementary heater (electric heating coil)



- 1 Extract air
- 2 Air filter with differential pressure switch (required)
- 3 Run-on thermostat
- 4 Temperature monitoring
- 5 Safety temperature limiter
- 6 Thyristor controller
- 7 Temperature sensor air outlet supplementary heater
- 8 Air flow monitoring
- 9 Heating/cooling coil
- 10 Condensate separator
- 11 Fan
- 12 Air-Injector with actuator
- 13 Supply air temperature sensor
- 14 Supply air
- 15 Liquid temperature sensor
- 16 Expansion valve
- 17 Shut-off valves
- 18 Condensing unit
- 19 Gas temperature sensor (supplied loose)

Table B3: TopVent® TP-6SK, TP-9RK, TP-9SK function diagram

Topvent® TP with supplementary heater (hot water)



- 1 Extract air
- 2 Air filter with differential pressure switch (optional)
- 3 Heating coil
- 4 Temperature sensor air outlet supplementary heater
- 5 Heating/cooling coil
- 6 Condensate separator
- 7 Fan
- 8 Air-Injector with actuator
- 9 Supply air temperature sensor
- 10 Supply air
- 11 Liquid temperature sensor
- 12 Expansion valve
- 13 Shut-off valves
- 14 Condensing unit
- 15 Gas temperature sensor (supplied loose)

Table B4: TopVent® TP-6AK, TP-9AK function diagram


**Caution**

Risk of fire due to dust in the air. TopVent® TP units with an electric heating coil must always be fitted with a filter.

## 2.4 Operating modes

The TopVent® TP has the following operating modes:

- Recirculation
- Recirculation speed 1
- 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 TopVent® unit can operate individually in a local operating mode:  
Off, Recirculation, Recirculation speed 1, Forced heating.

Code	Operating mode	Description
REC	Recirculation On/Off operation: 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.	Fan ..... speed 1/2 *) Heating/cooling ..... on *) Depending on heat or cool demand
REC1	Recirculation speed 1 The same as REC, but the unit operates only at speed 1 (low air flow rate)	Fan ..... speed 1 *) Heating/cooling ..... on *) Depending on heat or cool demand
ST	<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.	Fan ..... speed 2 Heating ..... 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.	Fan ..... speed 2 Cooling ..... on
L_OFF	<b>Off</b> (local operating mode) The unit is switched off.	Fan ..... off Heating/cooling ..... off
–	<b>Forced heating (only for units with supplementary heater)</b> The unit draws in room air, warms it and blows it back into the room. Forced heating is activated by connecting the unit to a power supply (only if there is no bus connection to the zone controller). 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.	Fan ..... speed 2 Heating ..... on

Table B5: TopVent® TP operating modes



## 3 Technical data

### 3.1 Unit type reference

	TP	- 6	A	K	...
<b>Unit type</b>					
TopVent® TP					
<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 B6: Unit type reference

### 3.2 Application limits

Fresh air temperature heating mode		min.	°C	-20
		max.	°C	15
Fresh air temperature cooling mode		min.	°C	-5
		max.	°C	40
Extract air temperature		max.	°C	50
Extract air relative humidity <sup>1)</sup>		max.	%	60
Moisture content of extract air <sup>1)</sup>		max.	g/kg	12.5
Supply air temperature		max.	°C	45
Air flow rate	Size 6:	min.	m³/h	3100
	Size 9:	min.	m³/h	5000
Condensate quantity	Size 6:	max.	kg/h	90
	Size 9:	max.	kg/h	150
Temperature of the heating medium <sup>2)</sup>		max.	°C	90
Pressure of the heating medium <sup>2)</sup>		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				
<sup>1)</sup> Units for applications where the humidity in the room increases by more than 2 g/kg are available on request.				
<sup>2)</sup> For units with supplementary hot water heater				

Table B7: Application limits

### 3.3 Electrical connection

#### TopVent® TP

Unit type		TP...6K TP-9...K TP-9-M
Supply voltage	V AC	3 × 400
Permitted voltage tolerance	%	± 5
Frequency	Hz	50
Connected load	kW	3.58
Current consumption max.	A	5.87
Series fuse	A	13.0

Table B8: TopVent® TP 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 B9: Electric heating coil electrical connections

#### ERQ250 condensing unit

Unit type		TP...6-K TP...9-K	TP-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 B10: Daikin ERQ250 condensing unit electrical connections

### 3.4 Flow rate, product parameters

Unit type		TP-6			TP-9				
Nominal air flow rate	m³/h	6000			9000				
Floor area covered	m²	537			946				
Static efficiency of the fans	%	63.6			63.6				
Heating/cooling section		6-K	6AK	6SK	9-K	9-M	9AK	9RK	9SK
Effective electric power input	kW	0.72	0.78	0.74	1.33	1.46	1.41	1.43	1.45

Table B11: TopVent® TP technical data

### 3.5 Condensing unit technical data

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
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 B12: Daikin ERQ250 condensing unit technical data

### 3.6 Sound data

Unit size		TP-6	TP-9
Sound pressure level (at a distance of 5 m) <sup>1)</sup>	dB(A)	52	59
Total sound power level	dB(A)	73	81
Octave sound power level	63 Hz	38	47
	125 Hz	57	67
	250 Hz	60	67
	500 Hz	65	73
	1000 Hz	69	76
	2000 Hz	67	74
	4000 Hz	64	73
	8000 Hz	54	65
1) with hemispherical radiation in a low-reflection environment			

Table B13: TopVent® TP sound data

ERQ250 condensing unit			
Sound pressure level (at a distance of 5 m) <sup>1)</sup>	dB(A)	58	
Total sound power level <sup>2)</sup>	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 B14: Daikin ERQ250 condensing unit sound data



#### Note

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

## 3.7 Heat output

t <sub>F</sub> °C	t <sub>room</sub> °C	Type TP-	Q kW	H <sub>max</sub> m	t <sub>s</sub> °C	P <sub>HP</sub> kW	P <sub>E</sub> kW	Δp <sub>w</sub> kPa	m <sub>w</sub> l/h
-5	16	6–K	27.4	14.5	31.6	8.71	–	–	–
		6AK	37.5	12.7	36.6	9.25	–	0.0	295.0
		6SK	39.3	12.5	37.5	9.36	12.1	–	–
		9–K	27.4	18.0	27.0	8.71	–	–	–
		9–M	54.8	13.6	36.1	17.42	–	–	–
		9AK	44.3	14.9	32.6	9.36	–	0.0	490.0
		9RK	41.3	15.3	31.6	9.25	14.0	–	–
		9SK	45.4	14.7	33.0	9.36	18.2	–	–
	20	6–K	27.3	14.6	35.5	9.14	–	–	–
		6AK	–	–	–	–	–	–	–
		6SK	31.2	13.8	37.5	9.36	4.0	–	–
		9–K	27.3	18.2	31.0	9.14	–	–	–
		9–M	54.6	13.7	40.0	18.28	–	–	–
		9AK	–	–	–	–	–	–	–
		9RK	33.3	16.8	33.0	9.36	6.1	–	–
		9SK	33.3	16.8	33.0	9.36	6.1	–	–
-15	16	6–K	22.0	15.8	28.9	7.77	–	–	–
		6AK	32.1	13.5	33.9	8.45	–	0.0	295.0
		6SK	33.9	13.2	34.8	8.58	12.1	–	–
		9–K	22.0	19.6	25.3	7.77	–	–	–
		9–M	44.0	14.9	32.5	15.54	–	–	–
		9AK	38.9	15.7	30.8	8.58	–	0.0	490.0
		9RK	35.9	16.2	29.8	8.45	14.0	–	–
		9SK	40.0	15.5	31.2	8.58	18.2	–	–
	20	6–K	21.9	15.9	32.8	8.31	–	–	–
		6AK	–	–	–	–	–	–	–
		6SK	25.8	14.9	34.8	8.58	4.0	–	–
		9–K	21.9	19.8	29.2	8.31	–	–	–
		9–M	43.8	15.0	36.5	16.62	–	–	–
		9AK	–	–	–	–	–	–	–
		9RK	27.9	18.0	31.2	8.58	6.1	–	–
		9SK	27.9	18.0	31.2	8.58	6.1	–	–
Legend:	t <sub>F</sub> = Fresh air temperature t <sub>room</sub> = Room air temperature Q = Heat output H <sub>max</sub> = Maximum mounting height t <sub>s</sub> = Supply air temperature P <sub>HP</sub> = Power consumption of the condensing unit(s) P <sub>E</sub> = Power consumption of the electric heating coil Δp <sub>w</sub> = Water pressure drop m <sub>w</sub> = Water quantity								
Reference:	■ At room air temperature 16°C: extract air temperature 18°C ■ At room air temperature 20°C: extract air temperature 22°C Supplementary heater with hot water: Flow/Return 55°C/25°C								

Table B15: TopVent® TP heat outputs

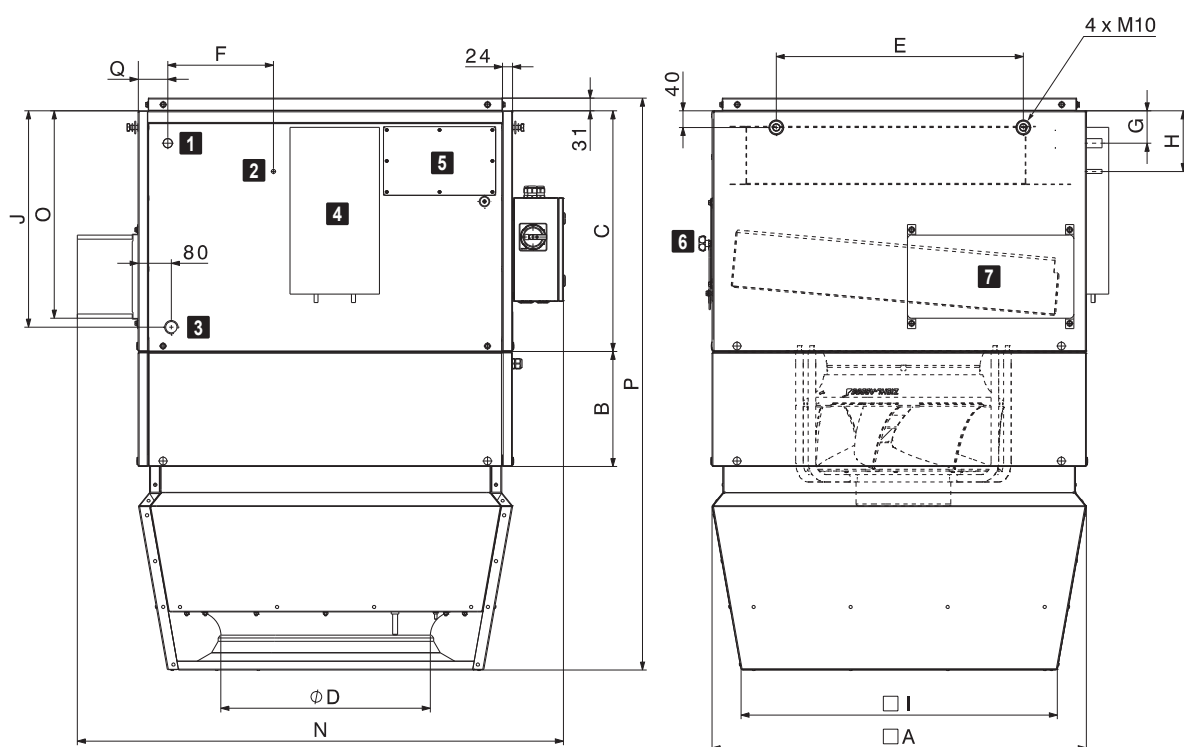
### 3.8 Cooling capacities

t <sub>F</sub> °C	t <sub>room</sub> %	RH <sub>room</sub> %	Type	Q <sub>sen</sub> kW	Q <sub>tot</sub> kW	t <sub>s</sub> °C	m <sub>C</sub> kg/h	P <sub>HP</sub> kW
28	22	50	6...K	16.8	22.1	15.7	7.8	4.24
			9...K	16.5	22.1	18.5	8.1	4.24
			9–M	34.4	44.0	12.6	14.0	8.44
		70	6...K	15.4	25.2	16.4	14.5	5.33
			9...K	16.3	27.3	18.6	16.2	5.77
			9–M	29.9	48.8	14.1	27.8	10.32
32	26	50	6...K	20.1	28.4	18.1	12.2	6.90
			9...K	19.8	28.4	21.5	12.6	6.90
			9–M	39.8	55.4	14.8	22.9	13.47
		70	6...K	15.0	29.2	20.6	20.8	6.94
			9...K	14.8	29.2	23.2	21.1	6.94
			9–M	30.7	54.6	17.9	40.7	13.89
<b>Legend:</b> t <sub>F</sub> = Fresh air temperature t <sub>room</sub> = Room air temperature RH <sub>room</sub> = Relative humidity of the room air Q <sub>sen</sub> = Sensible cooling capacity Q <sub>tot</sub> = Total cooling capacity t <sub>s</sub> = Supply air temperature m <sub>C</sub> = Condensate quantity P <sub>HP</sub> = Power consumption of the condensing unit(s)								
<b>Reference:</b> ■ At room air temperature 22°C: extract air temperature 24°C ■ At room air temperature 26°C: extract air temperature 28°C								

Table B16: TopVent® TP cooling capacities

### 3.9 Dimensions and weights

#### TopVent® TP with 1 heat pump system



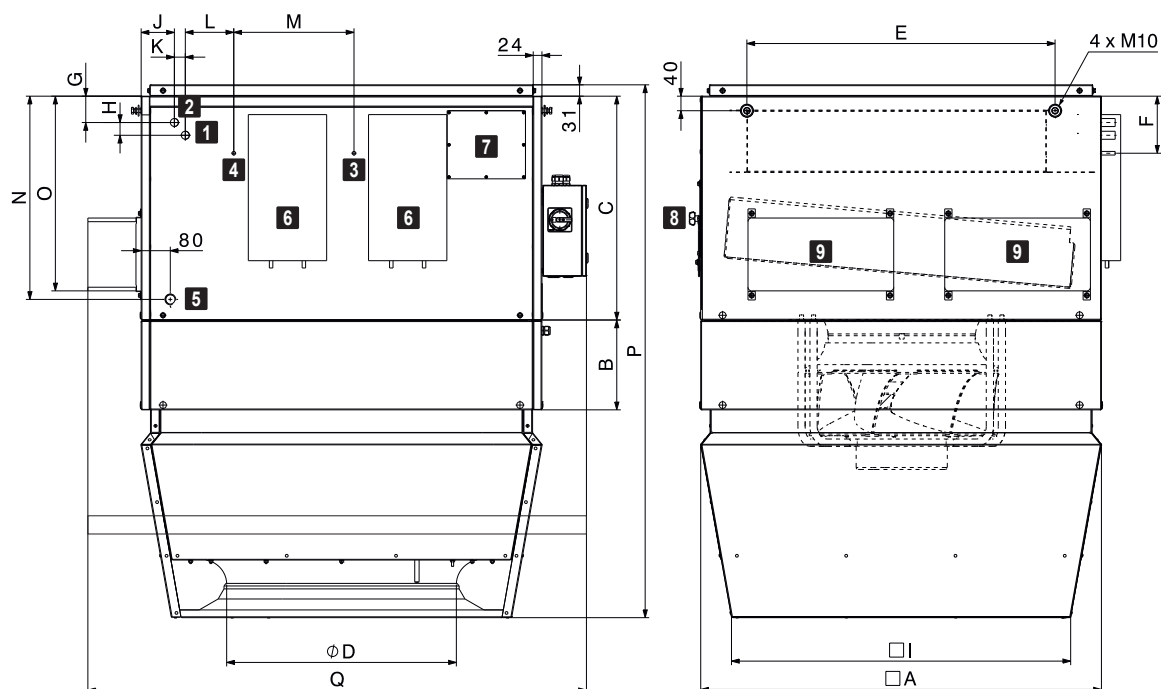
Unit type		TP-6-K	TP-9-K
A	mm	900	1100
B	mm	275	245
C	mm	579	615
Ø D	mm	500	630
E	mm	594	846
F	mm	254	360
G	mm	78	94
H	mm	146	182
I	mm	760	935
J	mm	521	558
N	mm	1169	1369
O	mm	499	535
P	mm	1375	1463
Q	mm	71	96

- 1 Gas line connection (Ø 22.2 mm)
- 2 Liquid line connection (Ø 9.5 mm)
- 3 Condensate connection (G1" external)
- 4 Expansion valve
- 5 Access panel, liquid temperature sensor
- 6 Access panel, condensate separator
- 7 Communication module

Unit type		TP-6-K	TP-9-K
Weight	kg	237	281

Fig. B6: Dimensions and weights of the TopVent® TP-6-K, TP-9-K

## TopVent® TP with 2 heat pump systems



Unit type		TP-9-M
A	mm	1100
B	mm	245
C	mm	615
Ø D	mm	630
E	mm	846
F	mm	157
G	mm	72
H	mm	35
I	mm	935
J	mm	91
K	mm	30
L	mm	133
M	mm	330
N	mm	558
O	mm	535
P	mm	1463
Q	mm	1369

- 1** Gas line connection – circuit 1 (Ø 22.2 mm)
- 2** Gas line connection – circuit 2 (Ø 22.2 mm)
- 3** Liquid line connection – circuit 1 (Ø 9.5 mm)
- 4** Liquid line connection – circuit 2 (Ø 9.5 mm)
- 5** Condensate connection (G1" external)
- 6** Expansion valve
- 7** Access panel, liquid temperature sensor
- 8** Access panel, condensate separator
- 9** Communication module

Unit type		TP-9-M
Weight	kg	304

Fig. B7: Dimensions and weights of the TopVent® TP-9-M

## TopVent® TP with supplementary heater (electric heating coil) and flat filter box

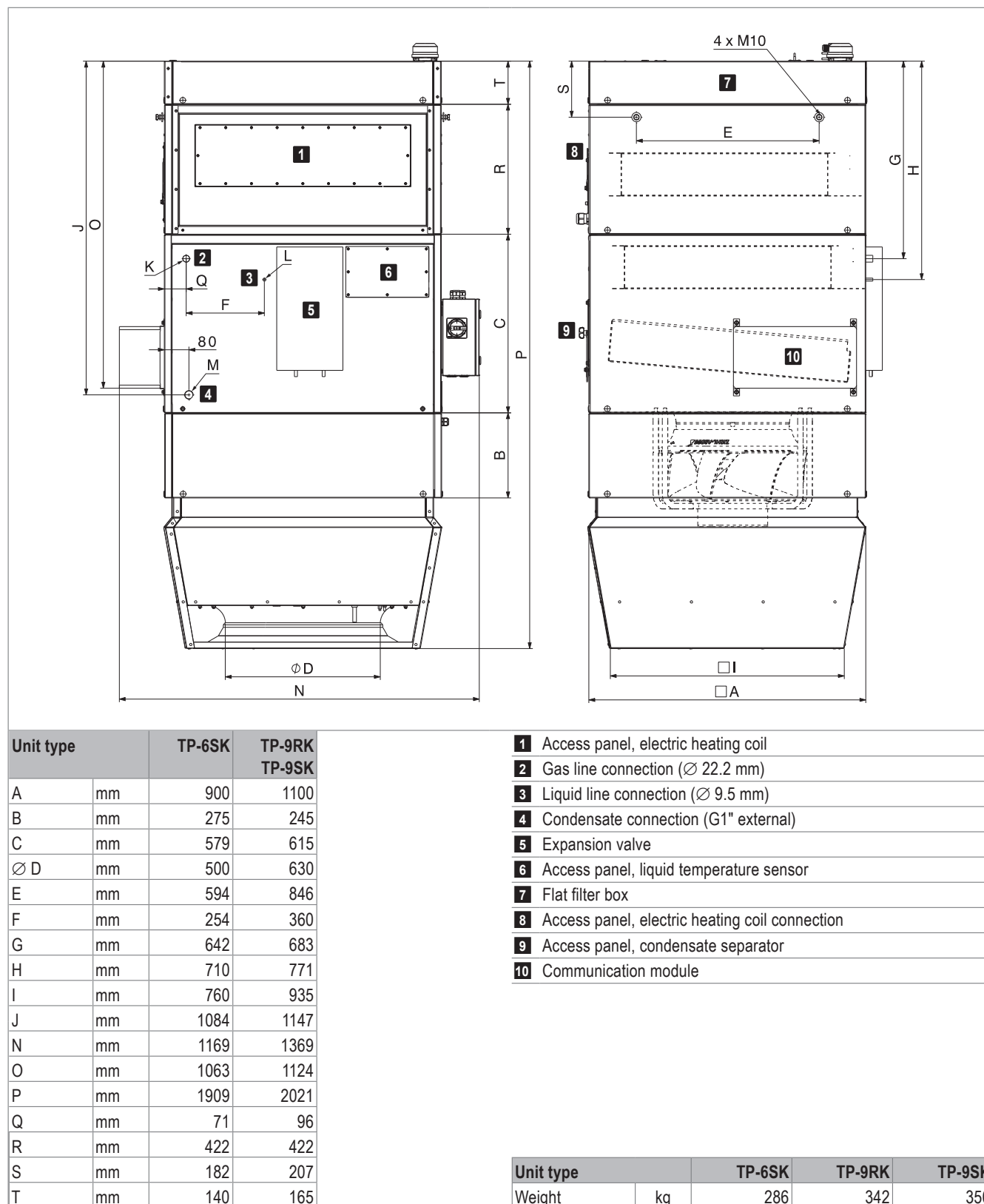
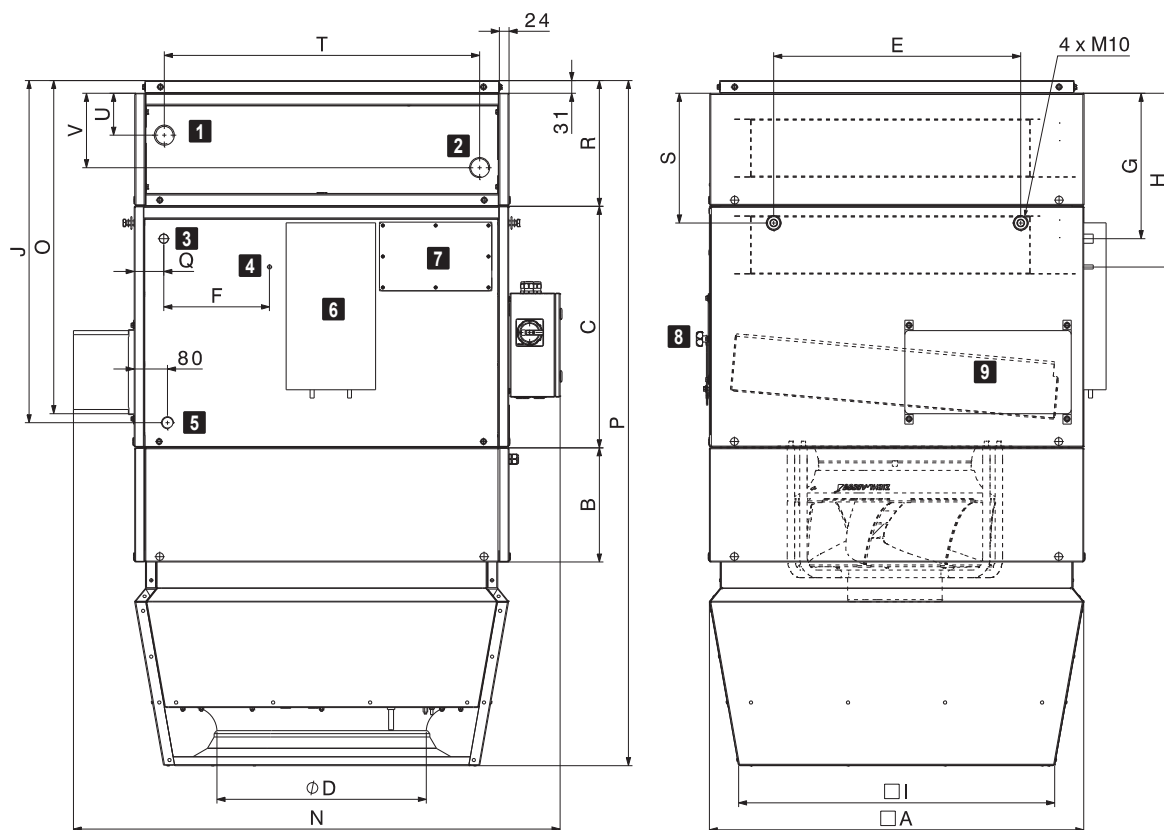


Fig. B8: Dimensions and weights of the TopVent® TP-6SK, TP-9RK, TP-9SK with flat filter box

## Topvent® TP with supplementary heater (hot water)



Unit type		TP-6AK	TP-9AK
A	mm	900	1100
B	mm	275	245
C	mm	579	615
Ø D	mm	500	630
E	mm	594	846
F	mm	254	360
G	mm	350	396
H	mm	418	484
I	mm	760	935
J	mm	823	891
N	mm	1169	1369
O	mm	801	867
P	mm	1647	1765
Q	mm	71	96
R	mm	303	333
S	mm	312	342
T	mm	758	882
U	mm	101	111
V	mm	179	189

- 1 Return
- 2 Flow
- 3 Gas line connection (Ø 22.2 mm)
- 4 Liquid line connection (Ø 9.5 mm)
- 5 Condensate connection (G1" external)
- 6 Expansion valve
- 7 Access panel, liquid temperature sensor
- 8 Access panel, condensate separator
- 9 Communication module

Unit type		TP-6AK	TP-9AK
Weight	kg	269	333
Hot water heating coil			
Connection	"	RP 1¼ internal	RP 1½ internal
Water capacity	l	3.1	4.7

Fig. B9: Dimensions and weights of the TopVent® TP-6AK, TP-9AK



Condensing unit

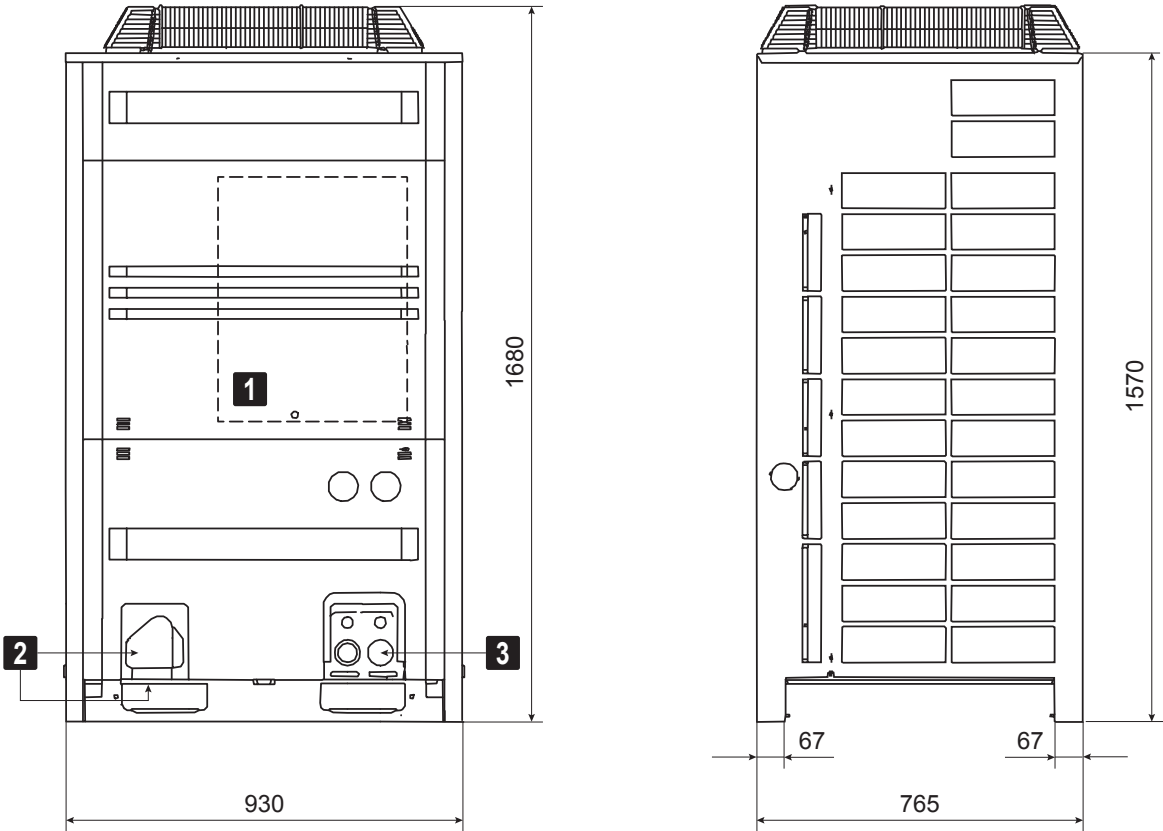
 <p>The drawing shows two views of the condensing unit. The front view on the left has a height of 1680 and a width of 930. It includes callouts: 1 points to an electrical connection box, 2 points to the working medium circuit connection, and 3 points to cable feedthroughs. The side view on the right has a height of 1570 and a width of 765, with 67mm dimensions indicating the side panel thickness.</p>		
1	Electrical connection box	Unit type
2	Working medium circuit connection (front or bottom)	Weight
3	Cable feedthroughs	kg
		ERQ250
		240

Table B17: Dimensions and weights of the Daikin ERQ250 condensing unit

## 4 Specification texts

### 4.1 TopVent® TP

Recirculation unit with heat pump system with changeover function for heating and cooling high spaces.

The unit consists of the following components:

- Heating/cooling section
- Air-Injector
- Supplementary heater (option)
- Unit control box
- 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 TopVent® TP 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 'fan coil unit' type.

---

#### 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 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).
- The radial fan with high-efficiency EC motor, backwards-curved, 3D contoured blades and free-running rotor made of a high-performance composite material, aerodynamically optimised inflow nozzle, low-noise, with integrated overload protection

---

#### 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 temperature sensor

---

#### Unit control box

---

Control box mounted on the side of the casing, casing made of aluzinc sheet metal, protection class IP54. The following components are installed:

- Main switch (can be operated from the outside)
- Unit controller as part of the TopTronic® C control system
- Fuse for the electronics
- Transformer
- Connection terminals
  - Power supply
  - Zone bus
  - Peripheral components

The components of the unit are fully wired up.

---

#### 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. Mounted on the side of the heating/cooling section.

#### Expansion valve

Kit with electronic expansion valve (cooling), thermally insulated and protected against mechanical damage. Mounted 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

#### Suspension set

for ceiling installation of the unit consisting of 4 pairs U-profiles made of aluzinc sheet steel, height-adjustable to 1300 mm. Paint according to unit.

#### Filter box

##### FILTER BOX WITH STANDARD FILTER

with 2 ISO coarse 60% bag filters (G4), with differential pressure switch for filter monitoring

##### FILTER BOX WITH HIGH-TEMPERATURE FILTER

with 2 ISO coarse 55% bag filters (G4), temperature-resistant up to 180 °C for use in combination with an electric heating coil, with differential pressure switch for filter monitoring

#### Flat filter box

##### FLAT FILTER BOX WITH STANDARD FILTER

with 4 pleated ISO coarse 60% cell filters (G4) with differential pressure switch for filter monitoring

##### FLAT FILTER BOX WITH HIGH-TEMPERATURE FILTER

with 4 pleated ISO ePM<sub>10</sub> 50% cell filters (M5), temperature-resistant up to 350 °C for use in combination with an electric heating coil, with differential pressure switch for filter monitoring

#### Standard paint finish

External paint finish in Hoval red (RAL 3000)

#### Paint finish as desired

Choice of external paint finish in RAL colour

#### Recirculation silencer

as an attachment to the unit, made of aluzinc sheet metal, lined with sound insulation matting, insertion attenuation 3 dB(A)

#### 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.

**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 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
- 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

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## 1 Unit type reference

	TP	-	6	A	K	/	ST	.	D1	/	S	.	FK	.	LH	.	U-	/	Y	.	KP	/	TC	.	-	.	PH	.	RF
<b>Unit type</b>																													
TopVent® TP																													
<b>Unit size</b>																													
6 or 9																													
<b>Heating section</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>Design</b>																													
ST Standard																													
<b>Air outlet</b>																													
D1 Design with 1 Air-Injector																													
<b>Installation</b>																													
- without																													
S Suspension set																													
<b>Filter box</b>																													
- without																													
FK Filter box																													
FF Flat filter box																													
<b>Paint finish</b>																													
- without																													
LH Standard paint finish																													
LU Paint finish as desired																													
<b>Silencer</b>																													
- without																													
U- Recirculation silencer																													
<b>Hydraulics</b>																													
- without																													
Y Hydraulic assembly diverting system																													
M Mixing valve																													

TP - 6 A K / ST . D1 / S . FK . LH . U- / Y . KP / TC . - . PH . RF

**Condensate pump**

- without

KP Condensate pump

**Control system**

TC TopTronic® C

**Reserve****Pump control**

- without

PH Heating pump

**Return temperature sensor**

- without

RF Return temperature sensor

## 2 Suspension set

A suspension set is available to make it easy to install the units on the ceiling. The set consists of 4 pairs of U-profiles made of Aluzinc sheet metal and is height-adjustable up to 1300 mm.

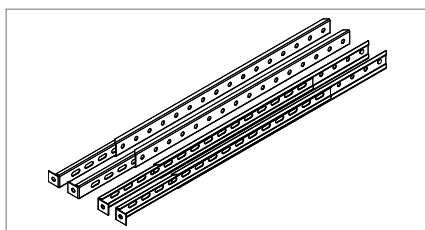


Fig. C1: Suspension set

## 3 Air filtration

For hygiene reasons, Hoval recommends always fitting TopVent® TP units with a filter. For TopVent® TP units with an electric heating coil, it is essential to use a filter in order to prevent the risk of fire.



### Caution

Risk of fire due to dust in the air. TopVent® TP units with an electric heating coil must always be fitted with a high-temperature filter.

### 3.1 Filter box

A filter box with 2 bag filters can be installed for the purpose of filtering the recirculation air. The modular construction made of Aluzinc sheet metal with 2 sliding doors makes it easy to replace the filters.



### Note

In the planning phase make sure there is enough space in front of the sliding doors so that the filters can be replaced with ease.

A pressure difference control device is installed for automatic monitoring of the filter. It shows when the filters have to be cleaned or changed.

Size		6	9	
A	mm	900	1100	
Q	mm	400	400	
Standard	Filter class	ISO coarse 60 % (G4)		
	Weight	kg	20	24
	Factory setting of differential pressure switches	Pa	180	180
High-temperature	Filter class	ISO coarse 55 % (G4)		
	Weight	kg	23	28
	Factory setting of differential pressure switches	Pa	150	150

Table C1: Filter box technical data

### 3.2 Flat filter box

A flat filter box with 4 pleated cell filters can be installed for the purpose of filtering the recirculation air. A pressure difference control device is installed for automatic monitoring of the filter. It shows when the filters have to be cleaned or changed.

Size		6	9
A	mm	900	1100
Q	mm	140	165
Standard	Filter class	ISO coarse 60 % (G4)	
	Weight	kg	12.5
	Factory setting of differential pressure switches	Pa	100
High-temperature	Filter class	ISO ePM <sub>10</sub> 50 % (M5)	
	Weight	kg	18.5
	Factory setting of differential pressure switches	Pa	250

Table C2: Flat filter box technical data



## 4 Paint finish

If the customer wishes, the units can be provided with an exterior paint finish. There are 2 possibilities:

- Standard paint finish in Hoval red (RAL 3000)
- Paint finish in desired RAL colour

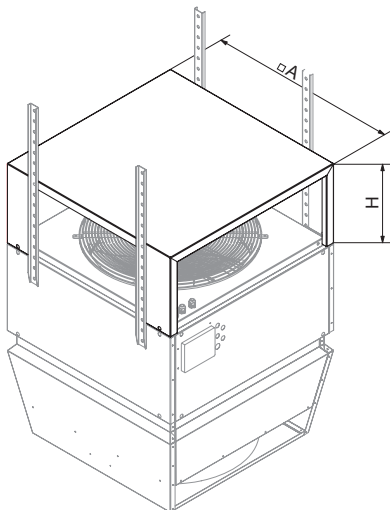
## 5 Recirculation silencer

The use of a recirculation silencer for noise reduction is recommended mainly if the TopVent® units are installed under flat, hard ceilings (e.g. made of concrete or sheet steel). The recirculation silencer is mounted on the appliance and thus reduces the sound reflection from the ceiling. Insertion attenuation is 3 dB (A) compared with the total sound power level of each TopVent® unit. Mount the recirculation units as usual via the 4 fastening points in the heating or heating/cooling section (for example, using the optional suspension set).



### Caution

Risk of injury from falling parts. The silencer cannot bear the weight of the appliance. Do not locate any suspension points on the silencer.



Size		6	9
A	mm	900	1100
H	mm	380	485
Weight	kg	15	20

Table C3: Dimensions and weights of the recirculation silencers

## 6 Hydraulic assembly diverting system



### Note

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 TopVent® 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. C2. 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.

### Pressure drop in kPa

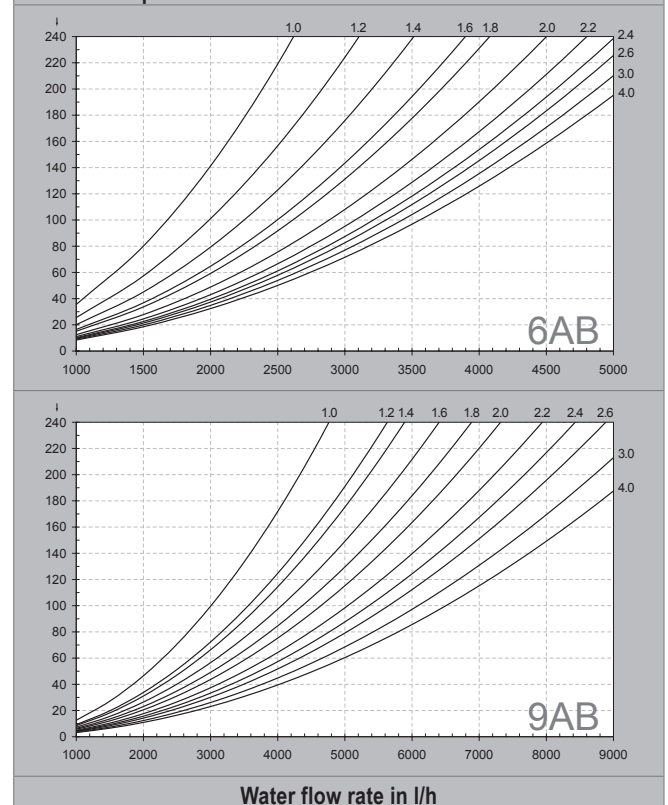
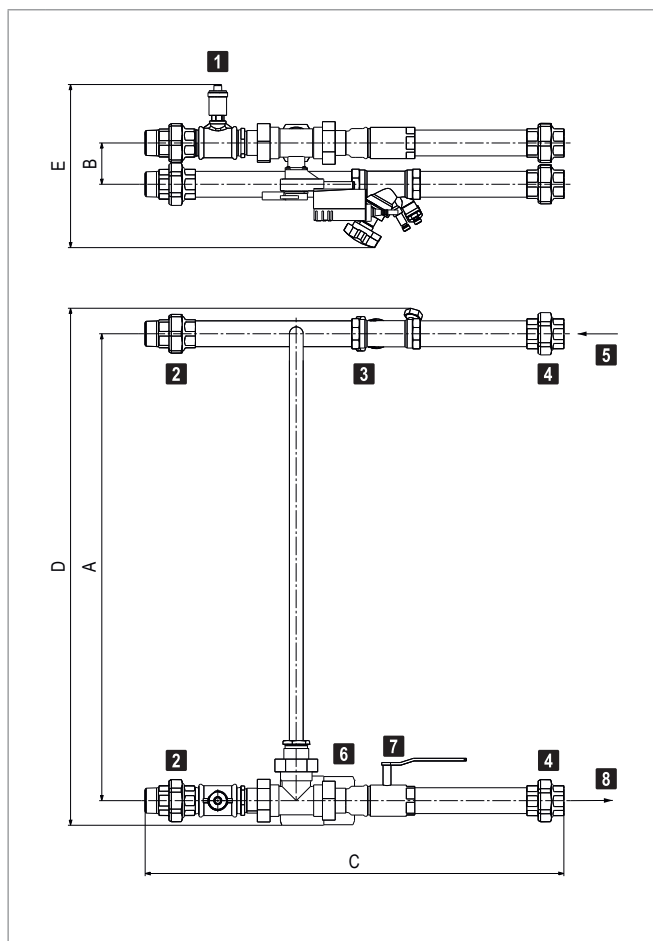
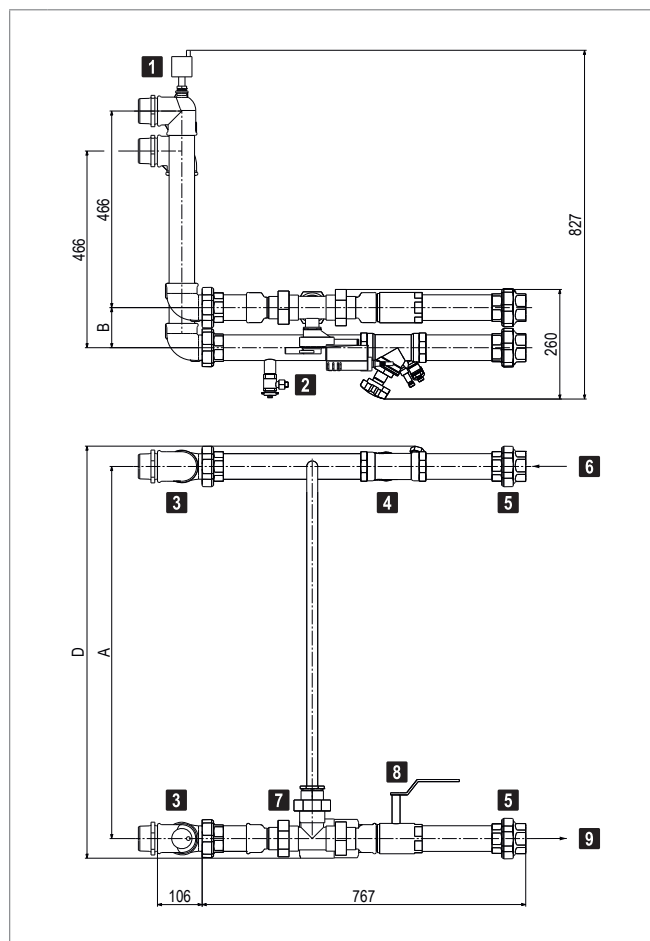


Fig. C2: Default settings for the balancing valves



- 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. C3: Dimensional drawing for hydraulic assembly



- 1** Automatic air vent
- 2** Drain valve
- 3** Adapter with screw union for coil connection
- 4** Control valve
- 5** Distributor circuit screw joint
- 6** Flow
- 7** Mixing valve
- 8** Ball valve
- 9** Return

Fig. C4: Dimensional drawing of the TopVent® TP hydraulic assembly for roof installation

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 C4: Dimensions (in mm) and valves of the hydraulic assembly

## 7 Mixing valve



### Note

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 TopVent® units. They have the following specifications:

- 3-way mixing valve with modulating rotary actuator (run time 9 s)
- Flow characteristic:
  - Equal percentage control path
  - Linear bypass
- Integrated position control and response

Type	DN	kvs m³/h	DA "	DI "	L mm	H mm	M mm	X mm	Y 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 C5: Dimensions mixing valves

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

Table C6: Weights mixing valves (in kg)

## 8 Condensate pump

TopVent® 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 C7: Technical data condensate pump

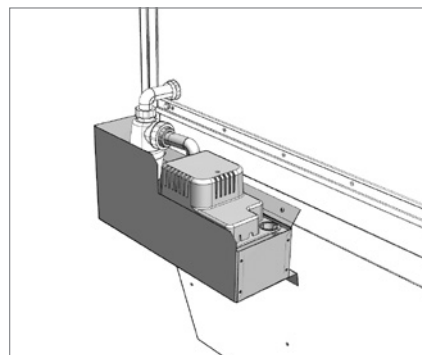


Fig. C5: Condensate pump

## 9 Return temperature sensor

**Note**

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

The return temperature sensor monitors the return temperature of the heating medium.

## 10 Pump control for mixing or injection system

**Note**

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

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

Please note the following:

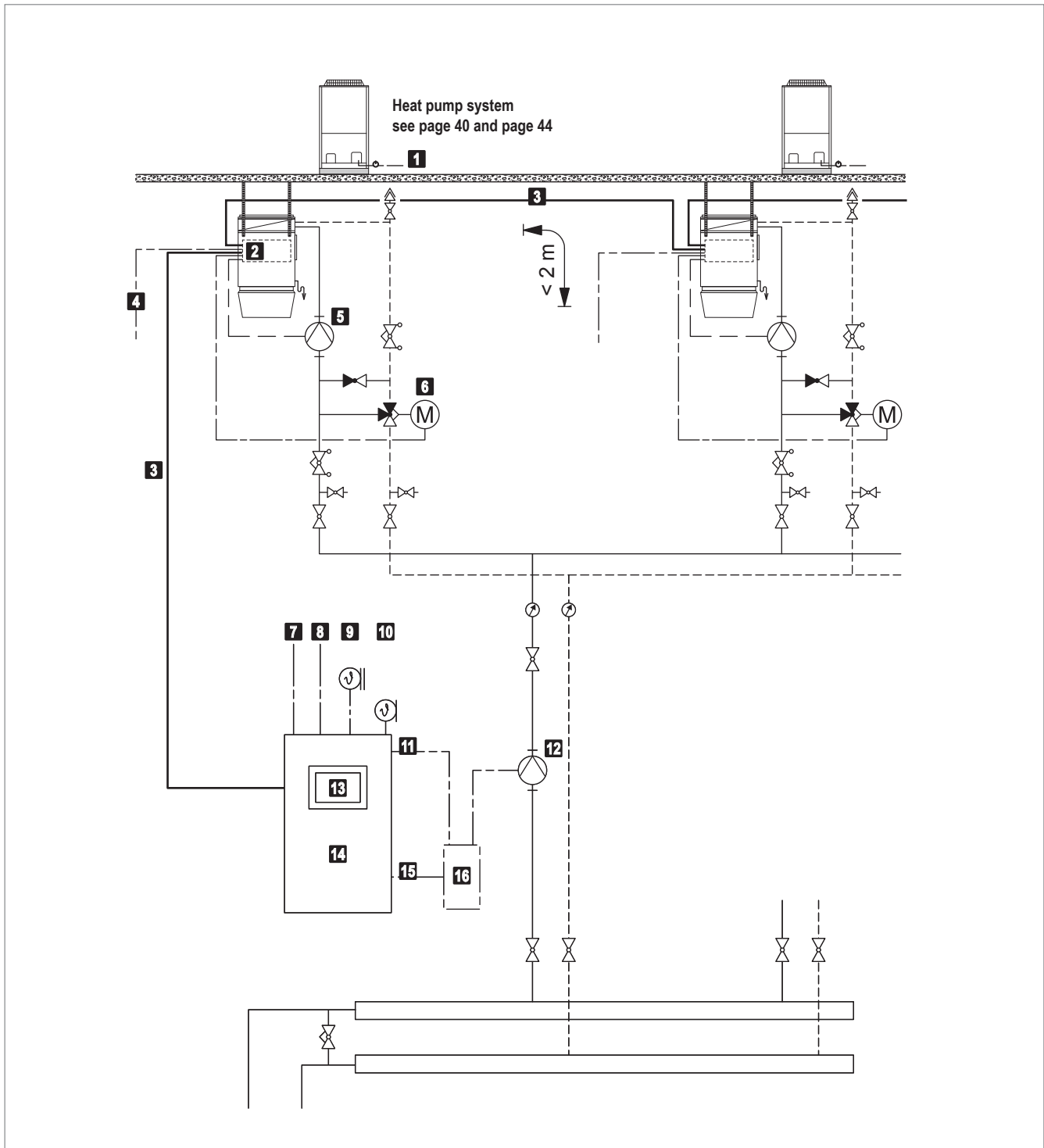
- Not only the mixing valves but also the pumps in the load circuit are controlled directly by the control block.
- Terminals for wiring the mixing valves and the pumps in the load circuit are located in the connection box.
- Make sure that valves and pumps which meet the following requirements are provided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

### 10.1 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  $\geq 0.5$ .
- The maximum run time of the valve actuator is 45 s.
- The valve actuator must be continuous, i.e. the stroke changes in proportion to the control voltage (DC 2...10 V).
- 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).

### 10.2 Requirements for pumps

- Voltage \_\_\_\_\_ 230 VAC
- Current \_\_\_\_\_ up to 4.0 A



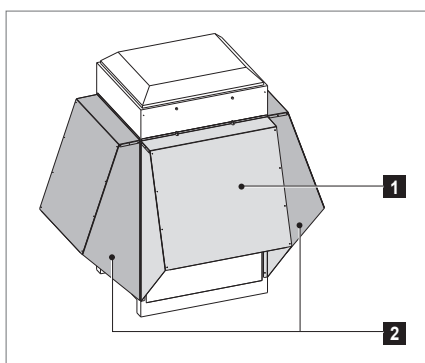
<b>1</b> Power supply for condensing unit	<b>7</b> Power supply control panel	<b>13</b> System operator terminal
<b>2</b> Unit control box	<b>8</b> Collective alarm	<b>14</b> Zone control panel
<b>3</b> Zone bus	<b>9</b> Fresh air temperature sensor	<b>15</b> Heating demand
<b>4</b> Power supply for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

Table C8: Schematic diagram for TopVent® TP injection system (supplementary heater with hot water)

## 11 Condensing unit options

### 11.1 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

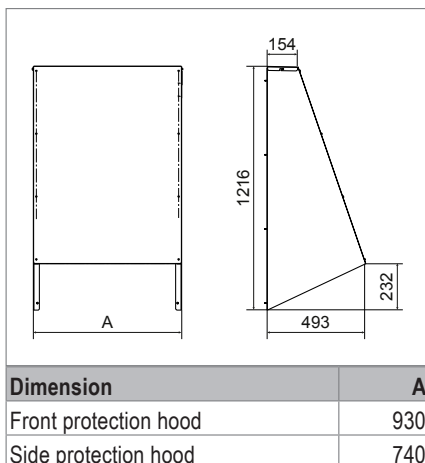


Fig. C7: Dimensions protection hood (in mm)

### 11.2 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.

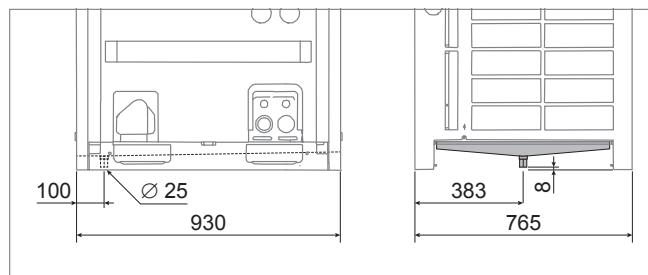


Fig. C8: Dimensions condensate drain pan (in mm)

### 11.3 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 condensate drain pan and connected in the condensing unit terminal box. Power: 250 W.

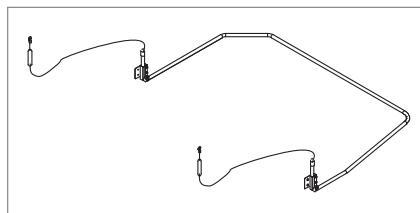


Fig. C9: Heating for condensate drain pan



## Transport and installation

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## 1 Installation

### 1.1 Preparation

The following guidelines are important when preparing for installation:

- The scope of delivery includes:
  - TopVent® unit, supplied as complete unit on pallet with expansion valve and communication module
  - Condensing unit
  - Accessories (installation material, trap, temperature sensor)
  - Optional components

#### TopVent® unit

- Make sure that a lifting platform is available.
- Only secure the unit to ceilings with sufficient load-bearing capacity.
- For the purposes of installation the unit is provided with 4 M10 rivet nuts with hexagon bolts and washers.
  - Fasten the unit to the ceiling by means of the optional suspension set or by means of flat iron bars, perforated bars, angles, steel cables or similar.
  - Do not use eyebolts.

#### 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.

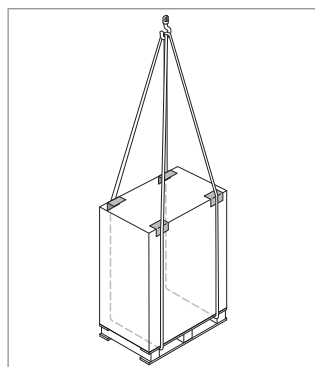


Fig. D1: Lifting with a crane

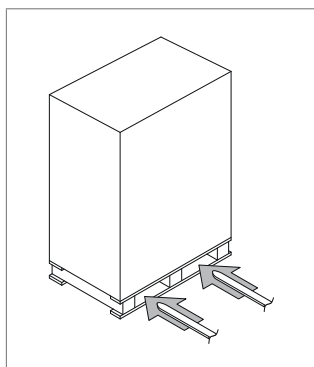
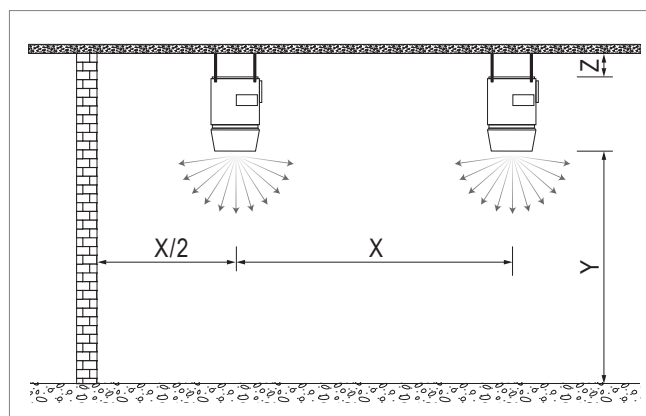


Fig. D2: Lifting with a forklift

### 1.2 Positioning

#### TopVent® unit

- Comply with the minimum and maximum distances.
- All air inlet and air outlet openings must be freely accessible. The supply air jet must be free to spread out unhindered.
- The access panels in the unit must be freely 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
Unit clearance X	min.	m	12	14
	max.	m	23	31
Distance from ceiling Z	min.	m	0.3	0.4
Mounting height Y	min.	m	4	5
	max. <sup>1)</sup>	m	Approx. 9...25	

<sup>1)</sup> 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

#### 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.

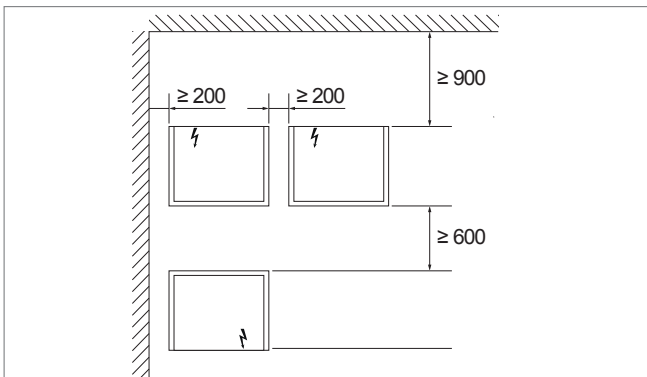


Bild D3: Space requirements for condensing unit (dimension in mm)

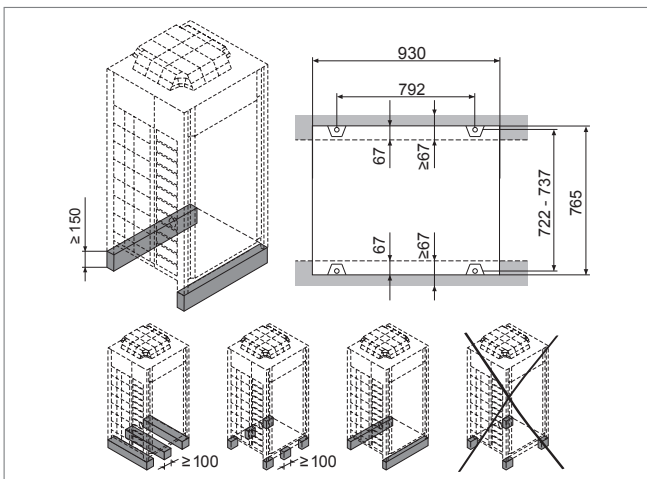


Fig. D4: Frame for condensing unit (dimensions in mm)

### 1.3 Unit installation

Proceed as follows to position the unit:

#### TopVent® unit

- Transport the unit to the installation site and rotate it to the correct position.
- Fasten the unit to the designated suspension points.

#### 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.

## 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. D5 and Fig. D6. Use the enclosed connection pipe to connect the expansion valve to the condenser/evaporator.

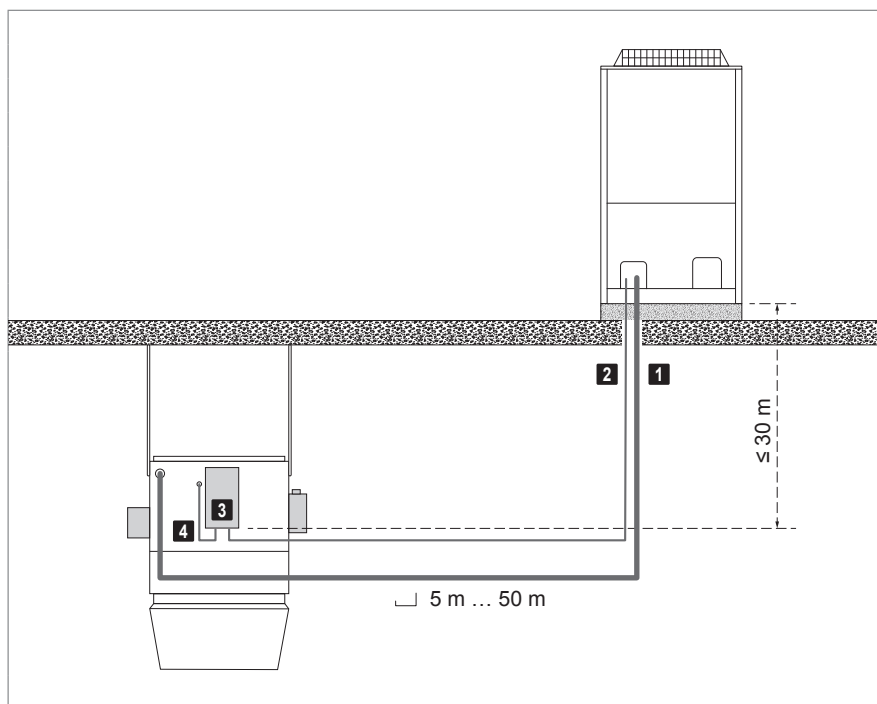
#### Refrigerant pipe specifications

- 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.

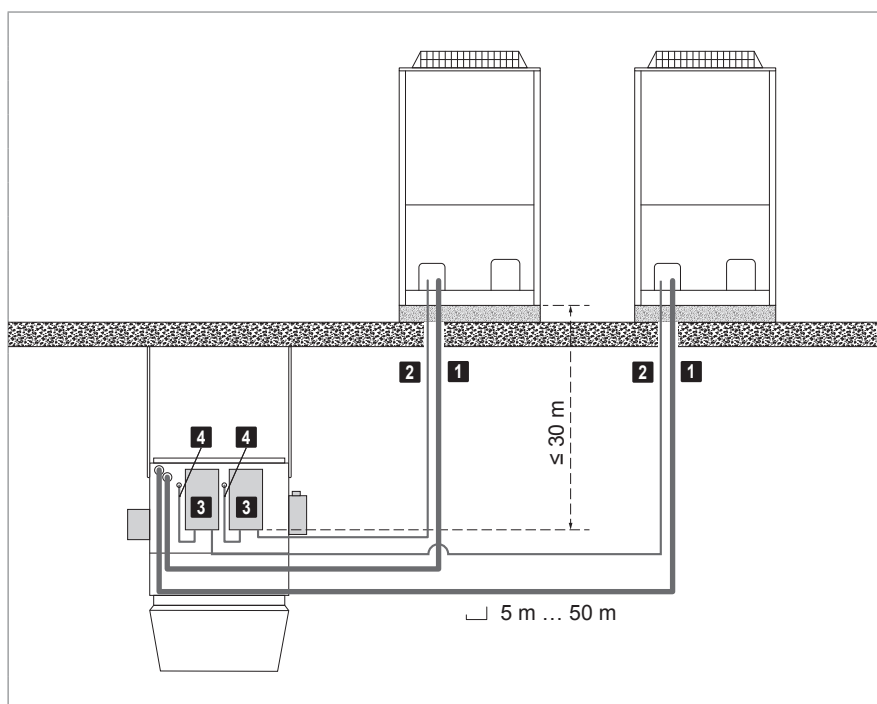
### Refrigerant pipes for TopVent® TP with 1 heat pump system



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

Fig. D5: TopVent® TP-6...K, TP-9...K refrigerant pipes to be installed on site

### Refrigerant pipes for TopVent® TP with 2 heat pump systems



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

Fig. D6: TopVent® TP-9-M refrigerant pipes to be installed on site

### 3 Hydraulic installation

#### 3.1 Condensate connection

##### TopVent® unit

Condensate arising in cooling units 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.

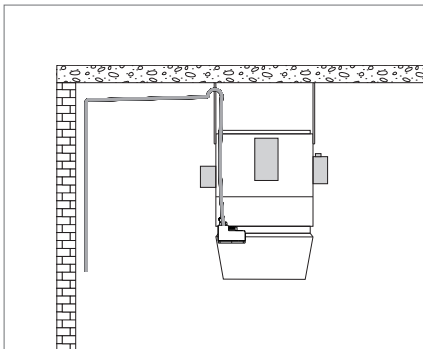


Fig. D7: Condensate line

##### 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.



##### Note

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  $\geq 0.5$ .
- The valve actuator must have a short run time ( $< 10$  s).
- The valve actuator must be continuous, i.e. the stroke changes in proportion to the control voltage (DC 2...10 V).
- 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.

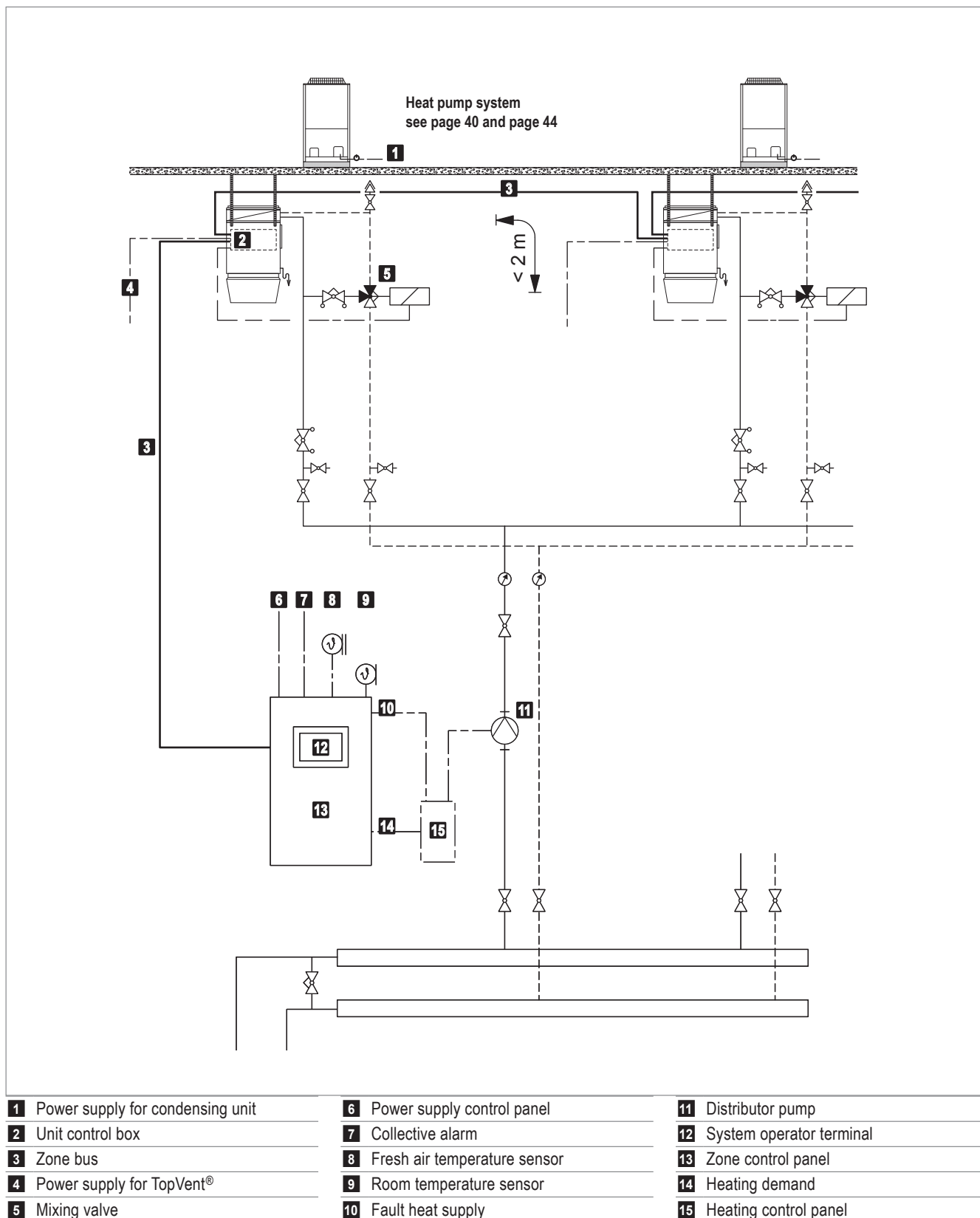


Table D2: Schematic diagram for hydraulic diverting system (supplementary heater with hot water)

### 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.

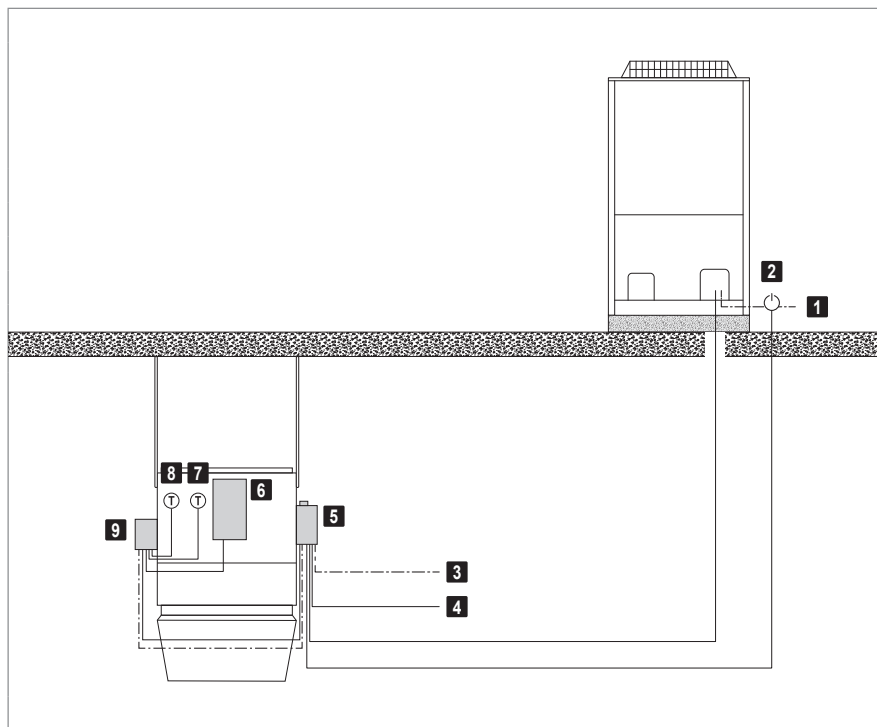


#### Caution

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 TopVent® TP
  - 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
- Connect the electrical components of the heat pump system.
- Connect optional components to the unit control box (condensate pump, return temperature sensor, mixing valve, pump).

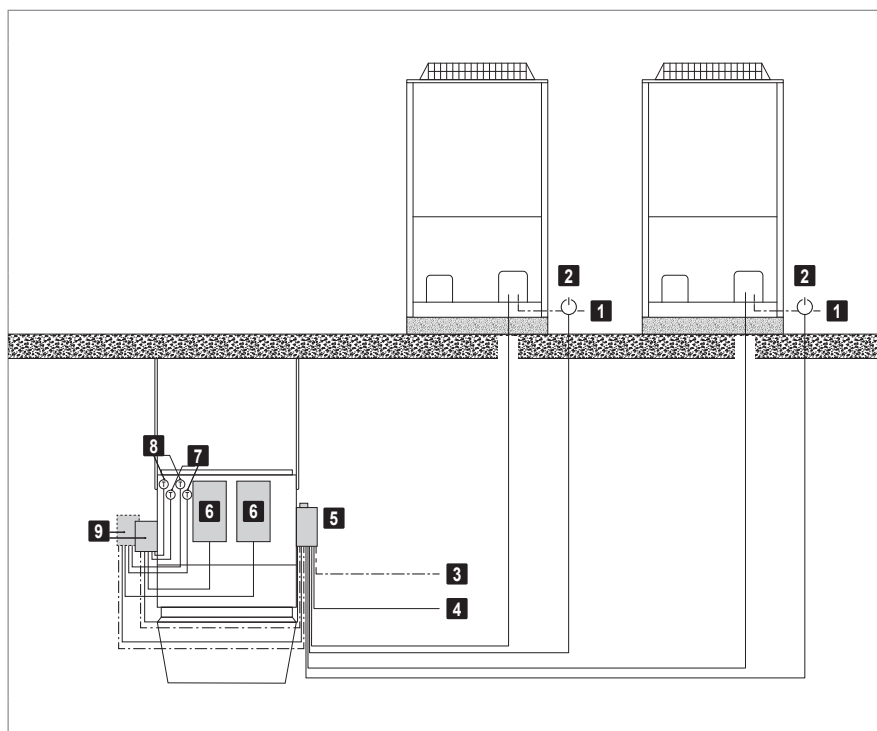
### Electrical installation for TopVent® TP with 1 heat pump system



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

Fig. D8: Electrical connection of the heat pump system for TopVent® TP-6...K, TP-9...K

### Electrical installation for TopVent® TP 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 for TopVent®
- 4 Zone bus
- 5 Unit control box
- 6 Expansion valve
- 7 Liquid temperature sensor
- 8 Gas temperature sensor (supplied loose)
- 9 Communication module

Fig. D9: Electrical connection of the heat pump system for TopVent® TP-9-M

Component	Designation	Voltage	Cable	Comments
Zone control panel	Power supply	3 × 400 VAC	NYM-J 5 × ... mm <sup>2</sup>	3-phase
		1 × 230 VAC	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 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 mm <sup>2</sup>	max. 3 A
	Power supply for units	3 × 400 VAC	NYM-J 5 × 1.5 mm <sup>2</sup> (min.)	RoofVent® units size 6
		3 × 400 VAC	NYM-J 5 × 4.0 mm <sup>2</sup> (min.)	RoofVent® units size 9
		3 × 400 VAC	NYM-J 5 × 1.5 mm <sup>2</sup> (min.)	TopVent® units
	Power supply for condensing unit	3 × 400 VAC	NYM-J 5 × 4.0 mm <sup>2</sup> (min.)	
	Power supply for electric heating coil	3 × 400 VAC	NYM-J 4 × 4.0 mm <sup>2</sup> (min.)	S type size 6, R type size 9
		3 × 400 VAC	NYM-J 4 × 10.0 mm <sup>2</sup> (min.)	S type size 9
	Heating demand	Volt-free max. 230 VAC max. 24 VDC	NYM-O 2 × 1.5 mm <sup>2</sup>	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 mm <sup>2</sup>	max. 1 A
	Distributor pump heat supply	3 × 400 VAC	NYM-J 4 × 1.5 mm <sup>2</sup> (min.)	Power supply 3-phase, max. 6 A
		1 × 230 VAC	NYM-J 3 × 1.5 mm <sup>2</sup> (min.)	Power supply 1-phase, max. 6 A
			NYM-O 4 × 1.5 mm <sup>2</sup>	Control line
	System operator terminal (if external)	24 VAC	NYM-J 3 × 1.5 mm <sup>2</sup>	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 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 VAC	J-Y(St)Y 5 × 2 × 0.8 mm	
	Forced off	24 VAC	NYM-O 2 × 1.5 mm <sup>2</sup>	max. 1 A

Component	Designation	Voltage	Cable	Comments
TopVent®	Power supply	3 × 400 VAC	NYM-J 5 × 1.5 mm <sup>2</sup> (min.)	
	Zone bus		J-Y(St)Y 2 × 2 × 0.8 mm	max. 1000 m length
	Mixing valve heating	24 VAC	NYM-O 5 × 1.0 mm <sup>2</sup>	
	Heating pump	230 VAC	NYM-J 3 × 1.5 mm <sup>2</sup>	Power supply
		24 VAC	NYM-O 4 × 1.0 mm <sup>2</sup>	Control line
	Power supply for electric heating coil	3 × 400 VAC	NYM-J 4 × 4.0 mm <sup>2</sup> (min.)	S type size 6, R type size 9
		3 × 400 VAC	NYM-J 4 × 10.0 mm <sup>2</sup> (min.)	S type size 9
Condensing unit (2 × for TP-9-M)	Power supply	3 × 400 VAC	NYM-J 5 × 4.0 mm <sup>2</sup> (min.)	
	Communication TopVent®		J-Y(St)Y 4 × 2 × 0.8 mm	
Condensing unit main switch (2 × for TP-9-M)	Fault message		J-Y(St)Y 1 × 2 × 0.8 mm	Auxiliary contact signal (NO contact, provided by the client)

Table D3: Cable list for on-site connections





## System design

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3 Checklist for project discussions .....	51

# 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
<ul style="list-style-type: none"> <li>Hall geometry (L × W × H)</li> <li>Internal heat gains (machines, lighting, etc.)</li> <li>Heating and cooling with decentralised heat pump</li> <li>Optimisation of the ventilation quality (no limitation on the number of units)</li> </ul>	46 × 40 × 9 m 23 kW → Unit type TP → Unit size 6
Design conditions heating: <ul style="list-style-type: none"> <li>Fresh air temperature</li> <li>Room temperature</li> <li>Extract air conditions</li> <li>Fabric heat losses</li> </ul>	- 20 °C 16 °C 18 °C 93 kW
Design conditions cooling: <ul style="list-style-type: none"> <li>Fresh air temperature</li> <li>Room temperature</li> <li>Extract air temperature</li> <li>Transmission sensible gains</li> </ul>	32 °C 26 °C / 40 %rh 28 °C 57 kW
<b>Number of units</b> <ul style="list-style-type: none"> <li>Calculate the required number of units:  <math>n = \text{base area} / \text{floor area reached}</math> </li> </ul>	$n = (46 \times 40) / 537 = 3.4$ → 4 units (size 6)
<b>Type of heating coil</b> <ul style="list-style-type: none"> <li>Calculate the required output for coverage of fabric heat losses per unit:  <math>Q_{H_{req}} = (\text{fabric heat losses} - \text{internal heat loads}) / n</math> </li> <li>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.</li> </ul>	$(93 - 23) / 4 = 17.5 \text{ kW per unit}$ TP-6-K: 20.0 kW → Heating/cooling coil type K
<b>Type of cooling coil</b> <ul style="list-style-type: none"> <li>Calculate the required output for coverage of transmission sensible gains per unit:  <math>Q_{C_{req}} = (\text{transmission sensible gains} + \text{internal heat loads}) / n</math> </li> <li>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.</li> </ul>	$(57 + 23) / 4 = 20.0 \text{ kW per unit}$ TP-6-K: 21.5 kW → Heating/cooling coil type K

Checks	
<ul style="list-style-type: none"> <li>Effective heat output  <math>Q_{H\_effective} = \text{Output for coverage of fabric heat losses} \times n</math> </li> </ul>	$20.0 \times 4 = 80.0 \text{ kW}$ $80.0 \text{ kW} > (93 - 23) \text{ kW}$ → OK
<ul style="list-style-type: none"> <li>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.  <math>Y = \text{Hall height} - \text{distance from ceiling} - \text{unit height}</math> </li> </ul>	$9000 - 1375 - 300 = 7325 \text{ mm}$ $Y_{min} = 4.0 \text{ m} < 7.33 \text{ m}$ → OK $Y_{max} = 16.4 \text{ m} > 7.33 \text{ m}$ → OK
<ul style="list-style-type: none"> <li>Effective cooling capacity  <math>Q_{C\_effective} = \text{Output for coverage of transmission sensible gains} \times n</math> </li> </ul>	$21.5 \times 4 = 86.0 \text{ kW}$ $86.0 \text{ kW} > (57 + 23) \text{ kW}$ → OK
<ul style="list-style-type: none"> <li>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. </li> </ul>	$n = 4 = 2 \times 2$ Unit clearance in length: $X = 46 / 2 = 23 \text{ m}$ $X_{max} = 23 \geq 23 \text{ m}$ $X_{min} = 12 \leq 23 \text{ m}$ → OK Unit clearance in width: $X = 40 / 2 = 20 \text{ m}$ $X_{max} = 23 \geq 20 \text{ m}$ $X_{min} = 12 \leq 20 \text{ m}$ → OK

## 2 Maintenance schedule

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

Table D1: Maintenance schedule

Project

Project No.

Name

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?

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

Internal heat gains (machines, ...)

 kW

Heating and cooling

Unit size

Control zones

### Design conditions heating

■ Standard outside temperature

 °C

■ Room temperature

 °C

■ Extract air temperature

 °C

■ Fabric heat losses

 kW

### Design conditions cooling

■ Standard outside temperature

 °C

■ Room temperature and humidity

 °C

 %

■ Extract air temperature

 °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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