Hoval

Indoor climate systems

TopVent® TP

Design handbook

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

Hoval | Responsibility for energy and environment

Hoval Indoor Climate Systems

Efficient. Flexible. Reliable.

Efficient. Flexible. Reliable.

Hoval indoor climate systems are decentralised systems for heating, cooling and ventilating halls for industrial, commercial and leisure applications. The systems have a modular structure. One system comprises several ventilation units which are spread around the room. These units are equipped with reversible heat pumps and gas-fired appliances 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

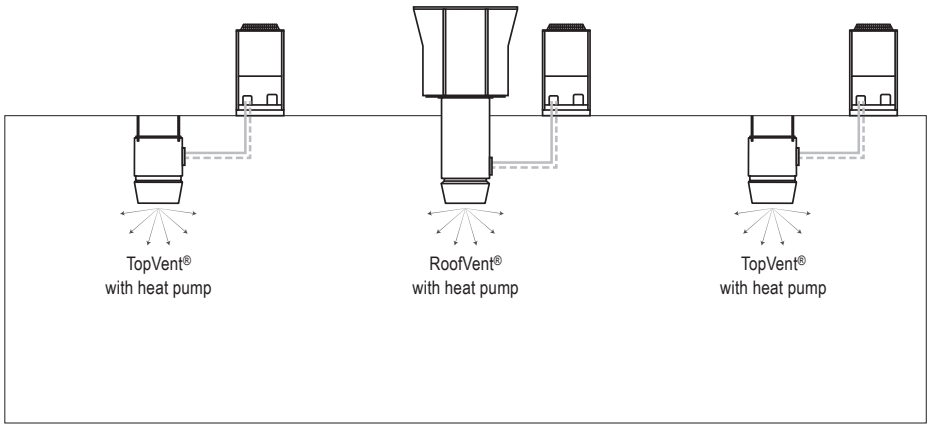
The number of supply and extract air handling units depends on how much fresh air is required in order to create a comfortable atmosphere for people in the building. Recirculation units cover additional heat or cool demand as required. A broad range of unit types and sizes with heating and cooling coils 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.

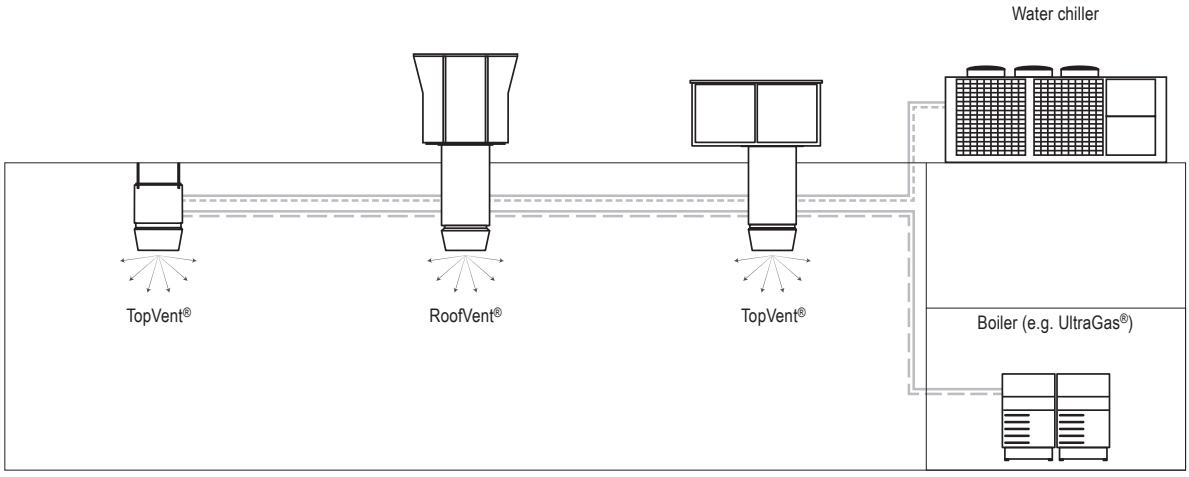
Control with specialist expertise
The TopTronic® C control system, which was specifically developed for Hoval indoor climate systems, regulates the separate units individually and controls them based on zones. This enables optimal adjustment to the local requirements of the different usage areas in the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

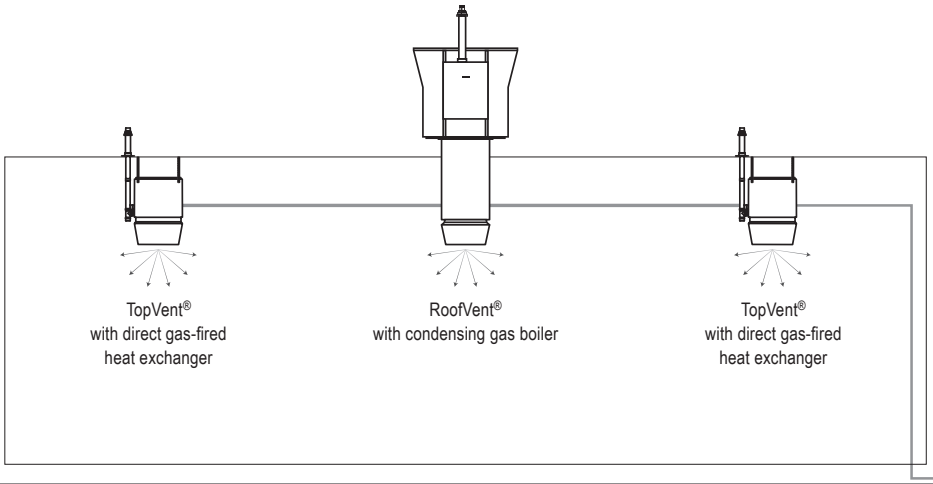
System with decentralised heat and cold generation with heat pump



System with central heat and cold generation



System with decentralised, gas-fired heat generation



TopVent® TP

Recirculation units with efficient air distribution
for heating and cooling spaces up to 25 m in height
with decentralised heat pump

1 Use

1.1 Intended use

TopVent® TP units are recirculation units intended for heating and cooling spaces up to 25 m in height with decentralised heat pump. 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 and destratification 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 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.

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.

2 Construction and operation

2.1 Construction

The TopVent® TP unit consists of the following components:

Recirculation unit:

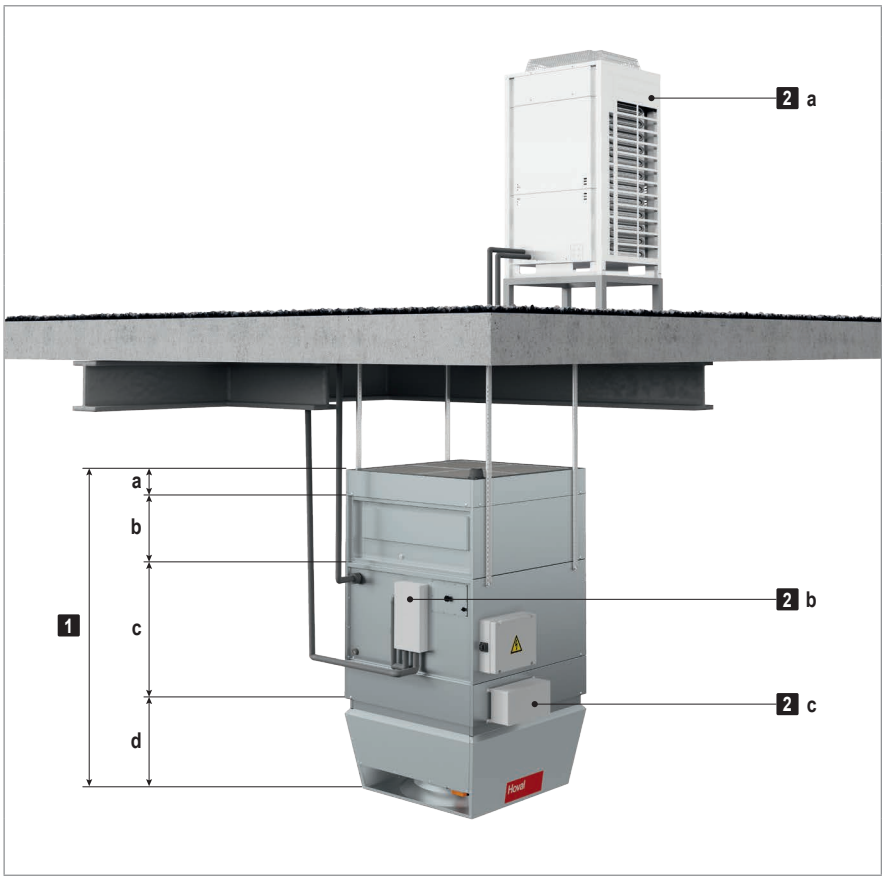
- Filter box (option):
  To filter the recirculation air
- Supplementary heater with electric heating coil (option):
  To support the heat pump at very low outside temperatures
- Supplementary heater with hot water (option):
  To support the heat pump at very low outside temperatures
- Heating/cooling 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:
  The Air-Injector is a patented, infinitely variable vortex air distributor for the draught-free introduction of air into the hall under changing operating conditions.

As part of the TopTronic® C control system, the unit control box is an integral component.

Heat pump system

The heat pump system consists of the following components:

- Reversible condensing unit
- Communication module
- Expansion valve

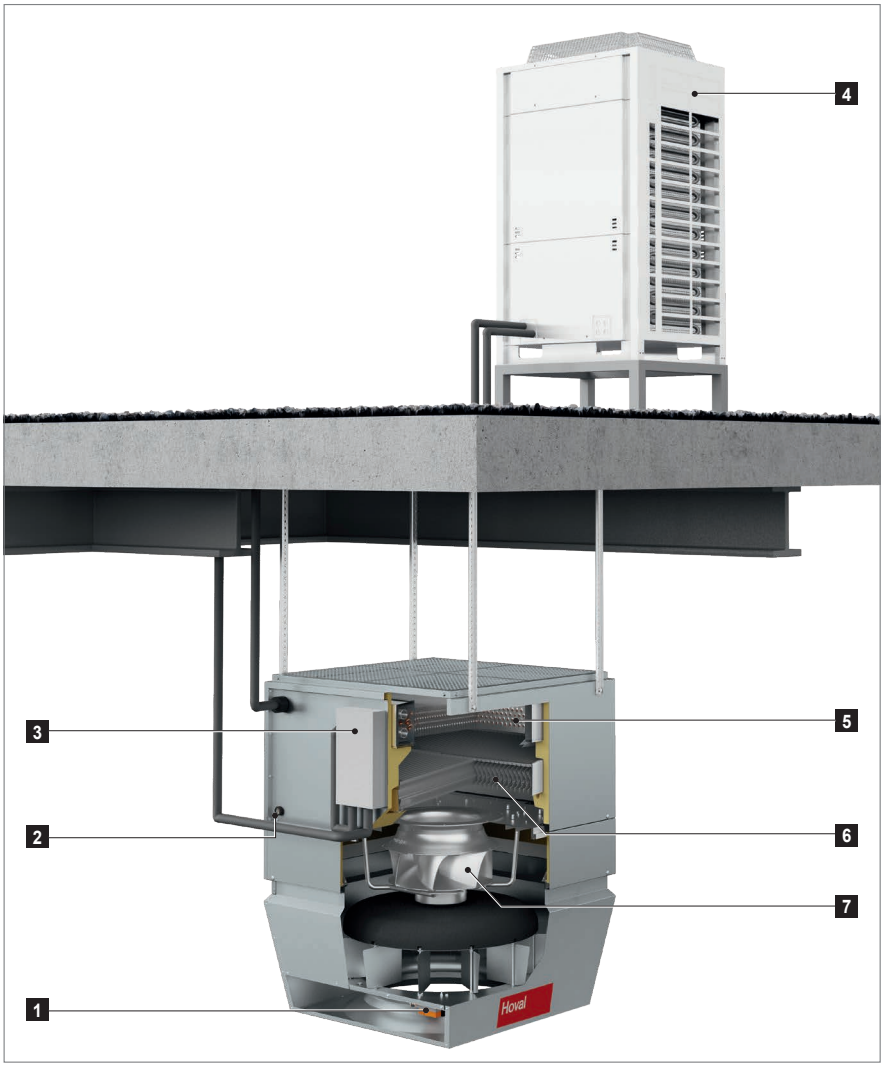


1 Recirculation unit
- **a** Flat filter box (option)
- **b** Supplementary heater (option)
- **c** Heating/cooling section
- **d** Air-Injector

2 Heat pump system
- **a** Reversible condensing unit
- **b** Expansion valve
- **c** Communication module

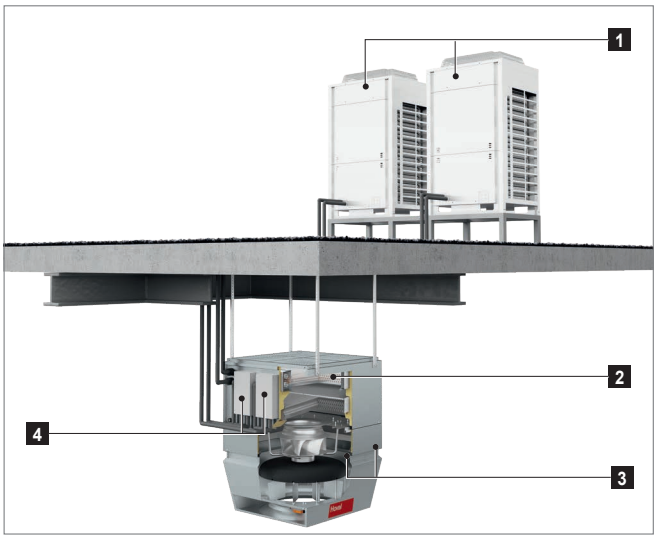
Fig. B1: TopVent® TP components

2.2 Construction variants



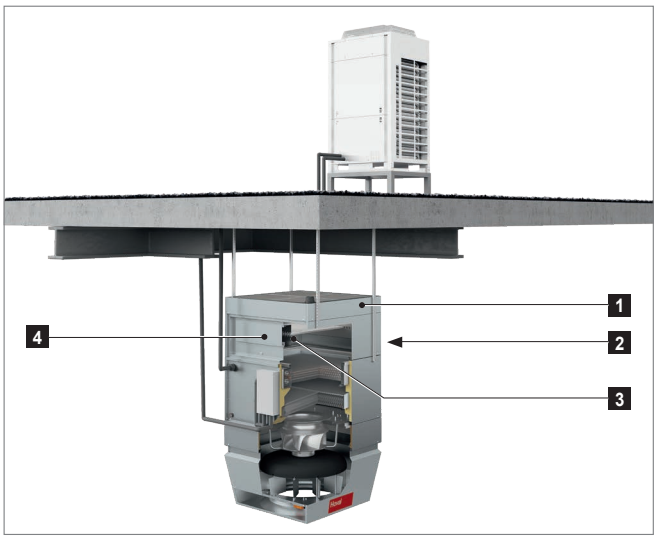
1	Actuator Air-Injector
2	Condensate connection
3	Expansion valve
4	Condensing unit
5	Condenser/evaporator
6	Condensate separator
7	Fan

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



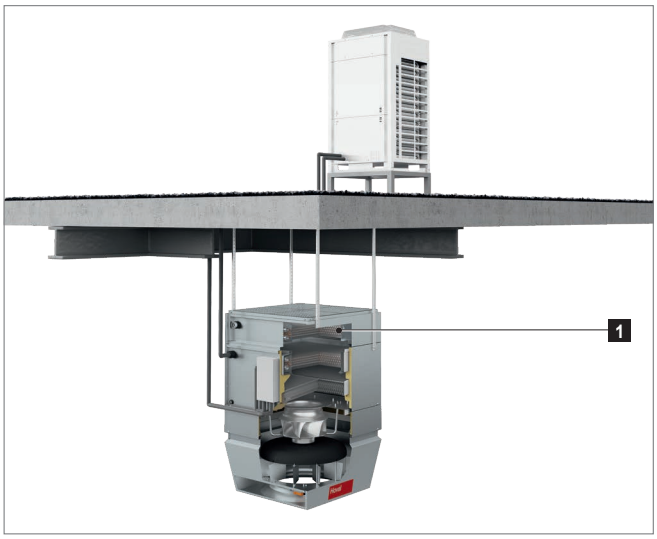
1 2 condensing units
2 Condenser/evaporator with 2 circuits
3 2 communication modules
4 2 expansion valves

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)

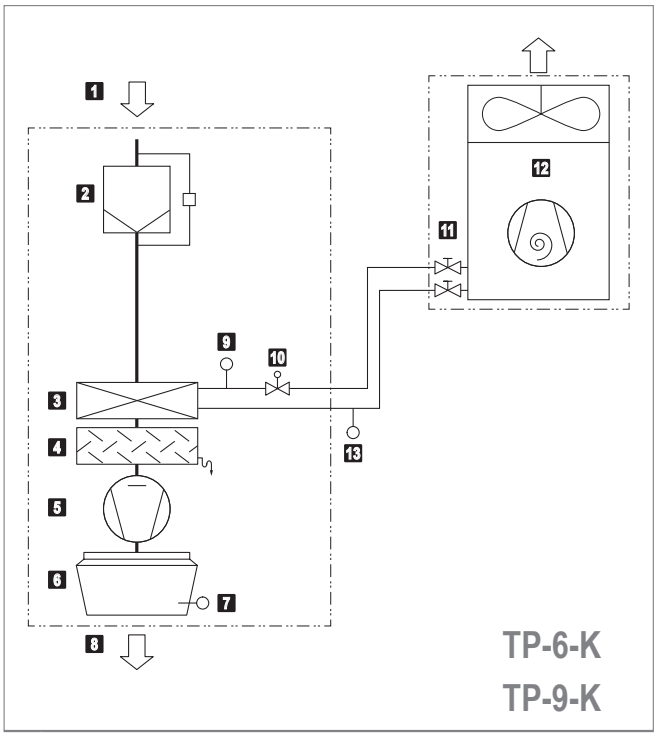


1 Heating coil (hot water)

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

2.3 Function diagrams

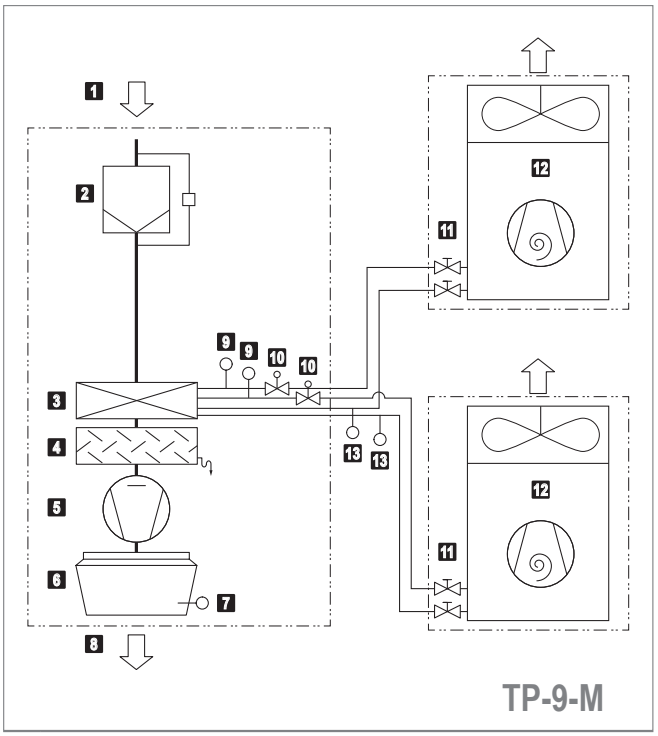
TopVent® TP with 1 heat pump system



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

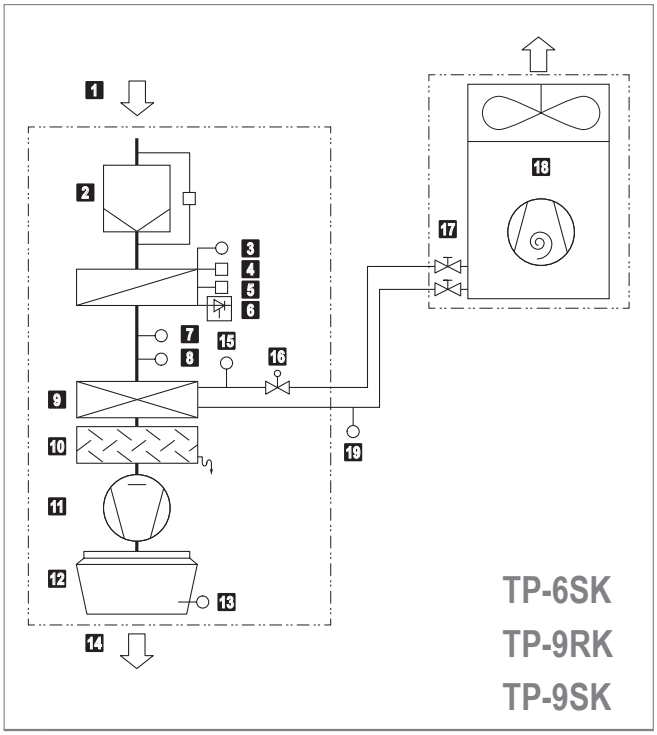
TopVent® TP with 2 heat pump systems



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)

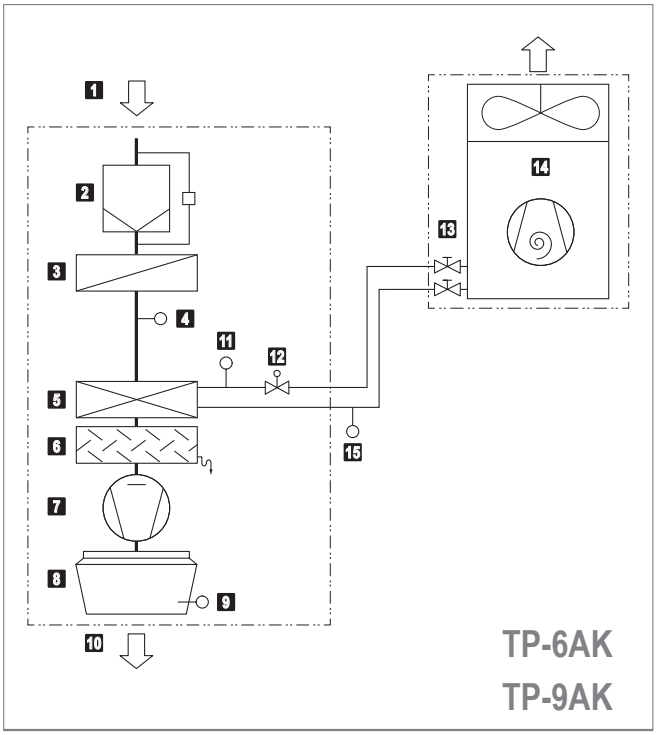


1	Extract air
2	Air filter with differential pressure switch (required)
3	Run-on thermostat
4	Temperature monitoring
5	Safety temperature limiter
6	Thyristor controller
7	Temperature sensor air outlet supplementary heater
8	Air flow monitoring
9	Heating/cooling coil
10	Condensate separator
11	Fan
12	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

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.

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

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.

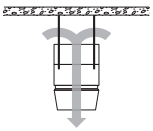
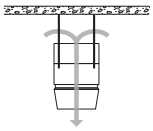
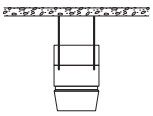
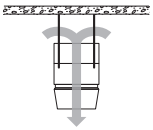
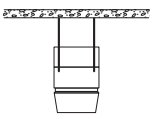
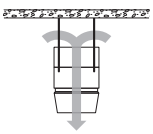
Code	Operating mode		Description
REC	**Recirculation** On/Off operation: during heat or cool demand, the unit draws in room air, heats or cools it and blows it back into the room. The room temperature set value day is active.		Fan ..... speed 1 / 2 [1)] Heating/cooling ..... on [1)] [1)] Depending on heat or cool demand
DES	■ Destratification: To avoid heat build-up under the ceiling, it may be appropriate to switch on the fan when there is no heat or cool demand (either in permanent operation or in on/off operation depending on the temperature stratification, as desired).		Fan ..... speed 2 Heating/cooling ..... off
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 [1)] [1)] Depending on heat or cool demand
DES	■ Destratification: The same as for REC, but the unit operates only at speed 1		Fan ..... speed 1 Heating/cooling ..... off
ST	**Standby** The unit is ready for operation. The following operating modes are activated if required:		
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 over-heating protection, the unit cools down the room in recirculation operation.		Fan ..... speed 2 Cooling..... on
L_OFF	**Off** (local operating mode) The unit is switched off.		Fan ..... off Heating/cooling ..... off
–	**Forced heating** (only for units with supplementary heater) The unit draws in room air, warms it and blows it back into the room. Forced heating is activated by 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 Type code

TP - 6 A K ...

Unit type
TopVent® TP

Unit size
6 or 9

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

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

Further options

Table B6: Type code

3.2 Application limits

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

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

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

Table B7: Application limits

3.3 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	3.6
Current consumption max.	A	5.9
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 Air flow rate

Unit type		TP-6	TP-9
Nominal air flow rate	m³/h	6000	9000
Floor area covered	m²	537	946

Table B11: Air flow rate

3.5 Condensing unit technical data

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

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

Table B12: Daikin ERQ250 condensing unit technical data

3.6 Sound level

TopVent® TP

Unit size			TP-6	TP-9
Sound pressure level (at a distance of 5 m) [1]		dB(A)	52	59
Total sound power level		dB(A)	73	81
Octave sound power level	63 Hz	dB	38	47
	125 Hz	dB	57	67
	250 Hz	dB	60	67
	500 Hz	dB	65	73
	1000 Hz	dB	69	76
	2000 Hz	dB	67	74
	4000 Hz	dB	64	73
	8000 Hz	dB	54	65

1) With hemispherical radiation in a low-reflection environment

Table B13: TopVent® TP sound level

ERQ250 condensing unit

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

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

Table B14: Daikin ERQ250 condensing unit sound level

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

3.7 Heat output

t_F	t_{room}	Type	Q	H_{max}	t_S	P_{WP}	P_E	Δp_W	m_W
°C	°C	TP-	kW	m	°C	kW	kW	kPa	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_F = Fresh air temperature
- t_{room} = Room air temperature
- Q = Heat output
- H_{max} = Maximum mounting height
- t_S = Supply air temperature
- P_{HP} = Power consumption of the condensing unit(s)
- P_E = Power consumption of the electric heating coil
- Δp_W = Water pressure drop
- m_W = Water quantity

Reference:
- 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 output

3.8 Cooling capacity

t_F	t_{room}	RH_{room}	Type	Q_{sen}	Q_{tot}	t_S	m_C	P_{WP}
°C	%	%	TP-	kW	kW	°C	kg/h	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

Legend:
- t_F = Fresh air temperature
- t_{room} = Room air temperature
- RH_{room} = Relative humidity of the room air
- Q_{sen} = Sensible cooling capacity
- Q_{tot} = Total cooling capacity
- t_S = Supply air temperature
- m_C = Condensate quantity
- P_{HP} = Power consumption of the condensing unit(s)

Reference:
- 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 capacity

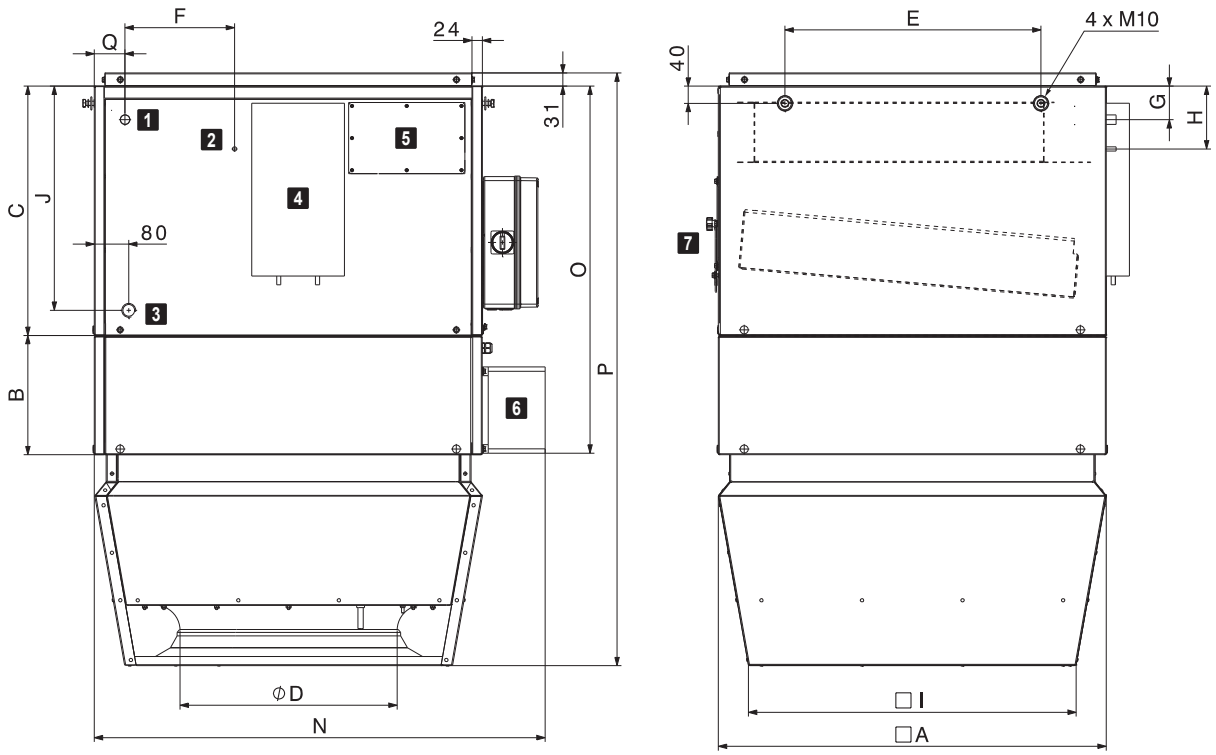
3.9 Product information according to ErP

Model	TopVent® TP								Unit
	6-K	6AK	6SK	9-K	9-M	9AK	9RK	9SK	
Cooling capacity (sensible) ($P_{rated,c}$)	20.9	20.9	20.9	20.6	42.1	20.6	20.6	20.6	kW
Cooling capacity (latent) ($P_{rated,c}$)	7.5	7.5	7.5	7.8	14.3	7.8	7.8	7.8	kW
Heating capacity ($P_{rated,h}$)	23.4	36.6	27.4	23.4	46.8	46.0	29.4	29.4	kW
Total electric power input (P_{elec})	0.72	0.78	0.74	1.33	1.46	1.41	1.43	1.45	kW
Sound power level (L_{WA})	74	76	75	80	81	80	81	81	dB
Contact details	Hoval Aktiengesellschaft Austrasse 70, 9490 Vaduz, Liechtenstein www.hoval.com								

Table B17: Product information according to Commission Regulation (EU) 2016/2281, Table 13

3.10 Dimensions and weights

TopVent® TP with 1 heat pump system



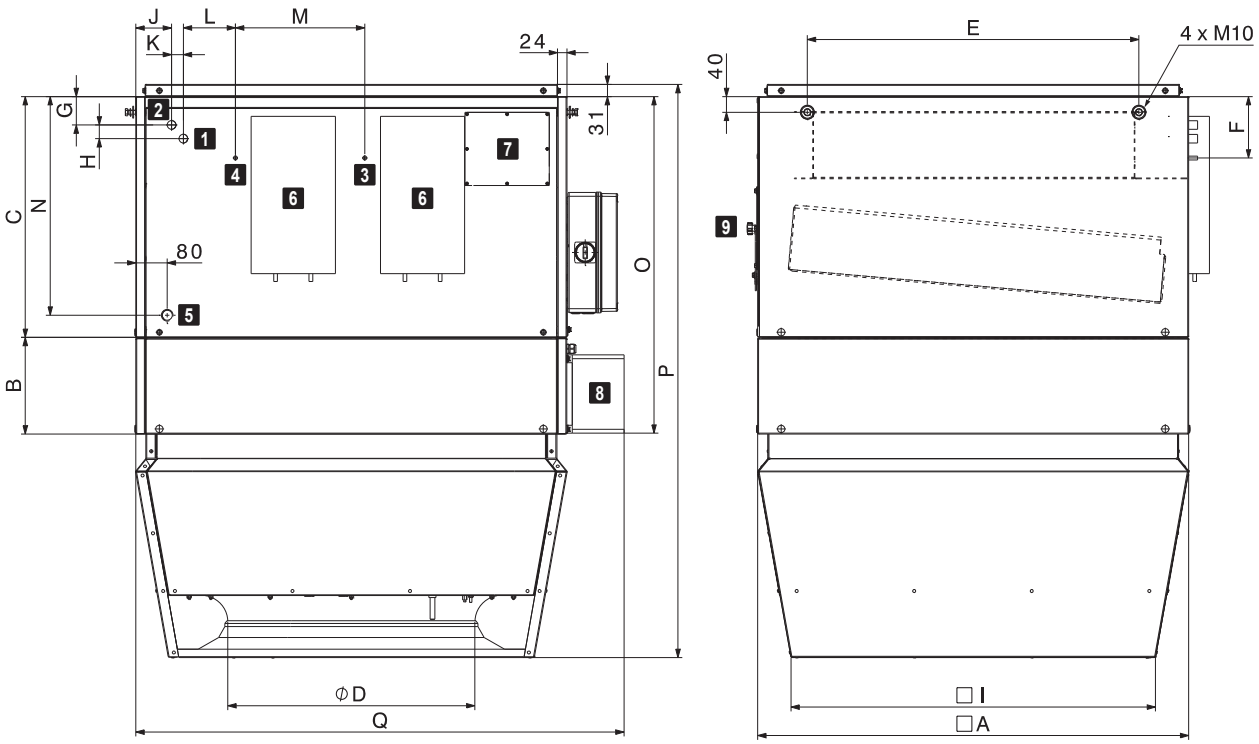
Unit type		TP-6-K	TP-9-K
A	mm	900	1100
B	mm	275	245
C	mm	579	615
∅ D	mm	500	630
E	mm	594	846
F	mm	254	360
G	mm	78	94
H	mm	146	182
I	mm	760	935
J	mm	521	558
N	mm	1046	1246
O	mm	852	859
P	mm	1375	1463
Q	mm	71	96

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

Unit type		TP-6-K	TP-9-K
Weight	kg	223	267
Refrigerant capacity condenser/evaporator	l	5.1	7.2

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

TopVent® TP with 2 heat pump systems



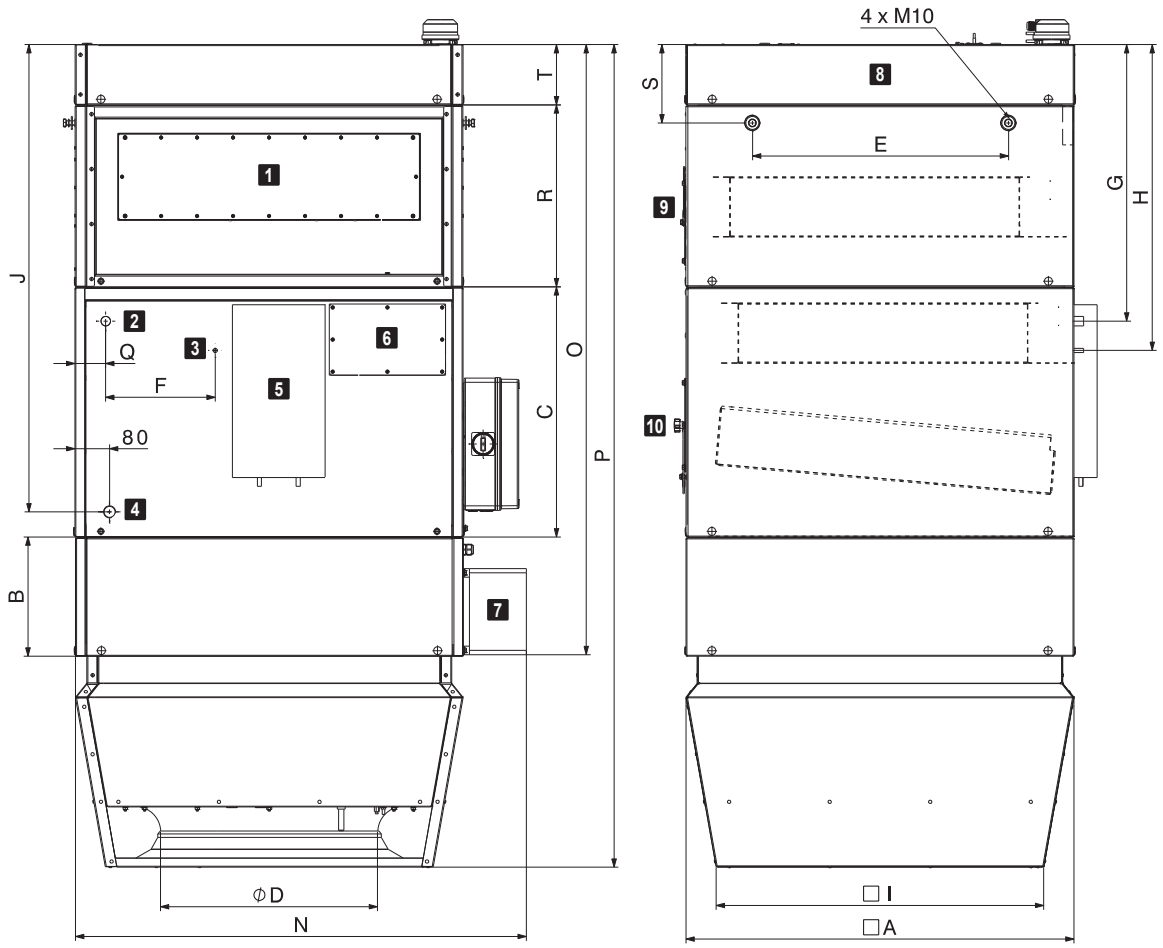
Unit type		TP-9-M
A	mm	1100
B	mm	245
C	mm	615
∅ D	mm	630
E	mm	846
F	mm	157
G	mm	72
H	mm	35
I	mm	935
J	mm	91
K	mm	30
L	mm	133
M	mm	330
N	mm	558
O	mm	859
P	mm	1463
Q	mm	1246

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

Unit type		TP-9-M
Weight	kg	290
Refrigerant capacity condenser/evaporator	l	2 × 5.8

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

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



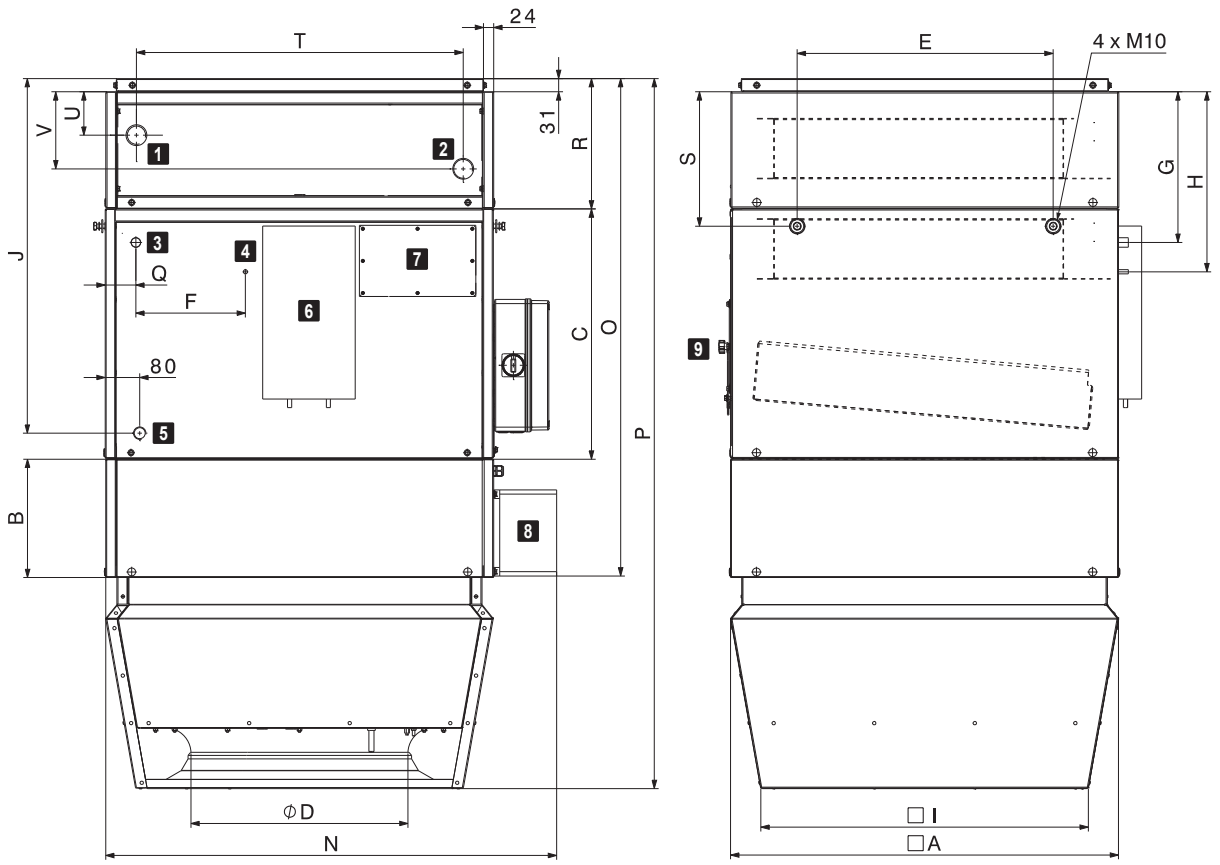
Unit type		TP-6SK	TP-9RK TP-9SK
A	mm	900	1100
B	mm	275	245
C	mm	579	615
∅ D	mm	500	630
E	mm	594	846
F	mm	254	360
G	mm	642	683
H	mm	710	771
I	mm	760	935
J	mm	1084	1147
N	mm	1046	1246
O	mm	1416	1448
P	mm	1909	2021
Q	mm	71	96
R	mm	422	422
S	mm	182	207
T	mm	140	165

1	Access panel, electric heating coil
2	Gas line connection (∅ 22.2 mm)
3	Liquid line connection (∅ 9.5 mm)
4	Condensate connection (G1" external)
5	Expansion valve
6	Access panel, liquid temperature sensor
7	Communication module
8	Flat filter box
9	Access panel, electric heating coil connection
10	Access panel, condensate separator

Unit type		TP-6SK	TP-9RK	TP-9SK
Weight	kg	273	329	337
Refrigerant capacity condenser/evaporator	l	5.1	7.2	7.2

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)



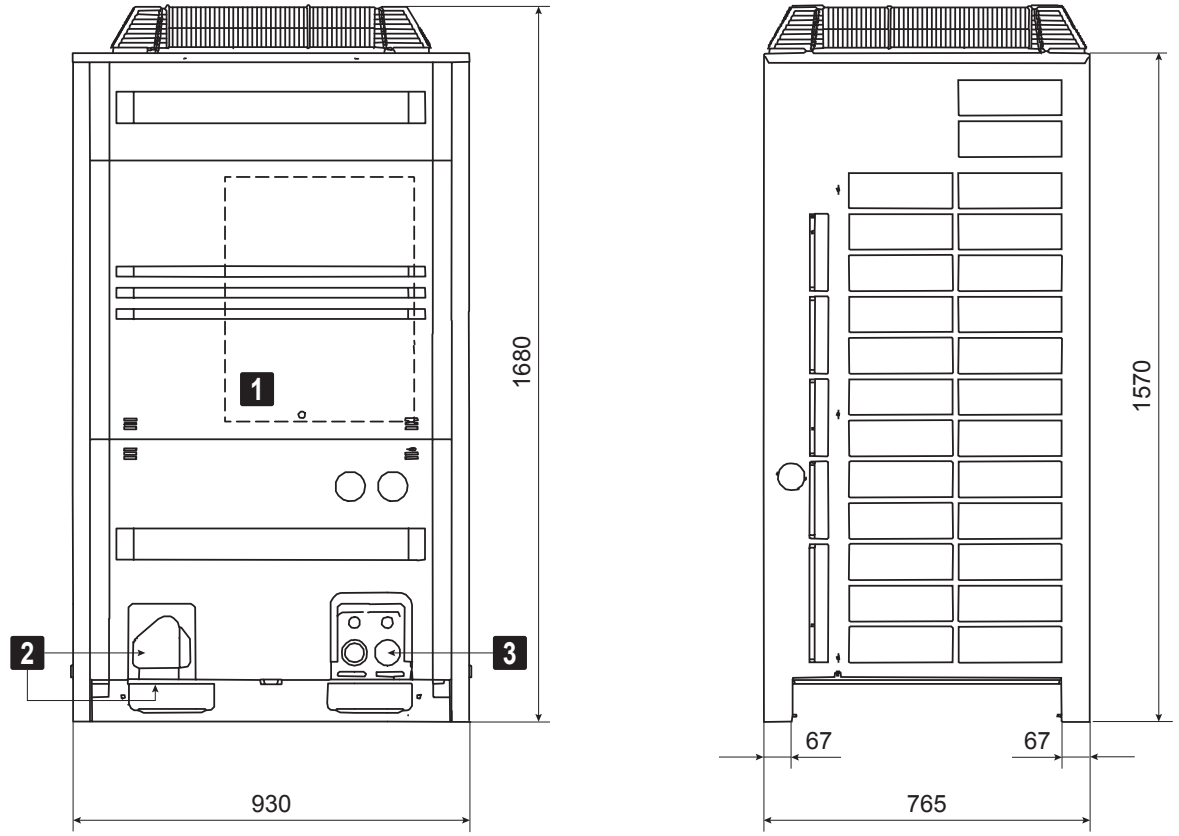
Unit type		TP-6AK	TP-9AK
A	mm	900	1100
B	mm	275	245
C	mm	579	615
∅ D	mm	500	630
E	mm	594	846
F	mm	254	360
G	mm	350	396
H	mm	418	484
I	mm	760	935
J	mm	823	891
N	mm	1046	1246
O	mm	1154	1192
P	mm	1647	1765
Q	mm	71	96
R	mm	303	333
S	mm	312	342
T	mm	758	882
U	mm	101	111
V	mm	179	189

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

Unit type		TP-6AK	TP-9AK
Weight	kg	255	319
Refrigerant capacity condenser/evaporator	l	5.1	7.2
Hot water heating coil			
Connection	"	RP 1¼ internal	RP 1½ internal
Water capacity	l	4.6	7.4

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

Condensing unit



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

Table B18: 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 spaces up to 25 m in height, equipped with highly efficient air distributor; maximum floor area reached per unit 537 m² (size 6) and 946 m² respectively (size 9).

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. They are systems of the 'fan coil unit' type, provided for in Commission Regulation (EU) 2016/2281.

Heating/cooling section

Housing made of magnesium-zinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of smooth internal surfaces and ageing-resistant, silicone-free sealing materials, internally insulated with close-pored polyurethane. The heating/cooling section contains:
- The highly efficient condenser/evaporator consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins, manifold made of copper and injection distributor
- The pull-out condensate separator with collecting channel, made of high-quality corrosion-resistant material, with a downslope in all directions for rapid draining
- The condensate trap for connecting to a condensate drain (supplied)
- 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 magnesium-zinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored polyethylene, with:
- Vortex air distributor with concentric outlet nozzle, adjustable vanes and integrated absorber hood
- Actuator for infinitely variable adjustment of the air distribution from vertical to horizontal
  - for draught-free air distribution in the hall under changing operating conditions
  - for the rapid and large-area reduction of temperature stratification in the room through induction of secondary air and strong mixing of the room air with supply air
- Supply air temperature sensor

Unit control box

Control box fitted at the side of the casing for connection of the power supply and housing the control components that facilitate energy-optimised operation, controlled by the control system TopTronic® C. Plastic casing, protection rating IP 56. The following components are installed:
- Isolation switch
- Circuit board with all required electrical components, unit controller (clipped on) as well as connection terminals for the following external connections:
  - Heating valve
  - Heating pump
  - Return temperature sensor

The circuit board is fitted with push-in terminals facilitating easy installation of the connection cables. All components in the unit control box as well as sensors and actuators in the unit are fully factory-wired.
Power supply and bus connection to be installed on site.

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 magnesium-zinc 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 magnesium-zinc 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 magnesium-zinc sheet, height-adjustable to 1300 mm

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 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_{10} 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
Exterior painting in Hoval red (RAL 3000), including optional components and suspension set.

Paint finish as desired
Exterior painting of the unit in choice of RAL colour, including optional components and suspension set.

Recirculation silencer
as an attachment to the unit, made of magnesium-zinc sheet, lined with sound insulation matting, insertion attenuation 3 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

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 – System control

Zone-based control system for the energy-optimised operation of decentralised Hoval indoor climate systems. Maximum system size per system bus: 64 control zones with up to 10 supply and extract air handling units or supply air handling units and 10 recirculation air handling units each.

Zone allocation:
Configured in advance for the customer at the factory:

	Room designation	Unit type
Zone 1:	_____	_____
Zone 2:	_____	_____
…		

System structure:
- Zone control panel made of coated sheet steel (light grey RAL 7035), … x … x … mm, with:
  - System operator terminal
  - Fresh air temperature sensor
  - 1 zone controller and 1 room temperature sensor per zone (expandable to up to 4 room temperature sensors per zone)
  - Safety relay
  - Electrical cabinet internally pre-wired, all components routed to terminals
- Zone bus: as serial bus for communication with all controllers in one control zone, with robust bus protocol via shielded, twisted bus cable (provided by the client)
- Unit controller: installed in the particular indoor climate unit, works autonomously according to the specifications of the zone controller
- Heating/cooling demand per zone with feedback monitoring

Functions, standard:
- Zone-based autonomous room control. Temperature and ventilation control separately adjustable for each zone
- Room temperature control via room-supply air cascade by means of energy-optimised double sequence control with priority circuit for energy recovery (supply and extract air handling units)
- Intelligent automatic heating to reach the desired room temperature at the switching time
- 5 adjustable room temperature set values per zone:
  - Cooling protection (lower setpoint in standby)
  - Overheating protection (upper setpoint in standby)
  - Room set value winter
  - Room set value summer
  - Night cooling set value (free cooling) (supply and extract air handling units)
- Destratification mode for even temperature distribution

- Main operating modes of supply and extract air handling units:
  VE .... Ventilation, infinitely variably adjustment
  AQ.... Air quality, automatic control with Hoval combination sensor (option), optional reference variable:
  – CO_2 or VOC
  – Air humidity (optimised dehumidification mode)
  REC . Recirculation, infinitely variably adjustment
  DES.. Destratification
  EA .... Exhaust air, infinitely variably adjustment
  SA .... Supply air, infinitely variably adjustment
  ST .... Standby

- Main operating modes of supply air units:
  REC . Recirculation, infinitely variably adjustment
  DES.. Destratification
  SA .... Supply air, infinitely variably adjustment
  With Hoval combination sensor (option) also demand-driven control of the fresh air ratio, optional reference variable CO_2 or VOC
  ST .... Standby
- Main operating modes of recirculated air units:
  REC . Recirculation, infinitely variably adjustment
  DES.. Destratification
  ST .... Standby

- Forced heating (construction site heating) can be activated on each device before completion of the overall system (activation by Hoval service technician)
- Control of draught-free air distribution with the Hoval Air-Injector: the discharge direction is adjusted infinitely variably and automatically according to the respective operating condition and the existing temperatures (heating/cooling).

Operation:
- TopTronic® C-ST system operator terminal: touch panel for visualisation and control of all Hoval indoor climate units registered on the bus

Options for operation:
- Hoval C-SSR operating software, for visualisation on customer's PC
- TopTronic® C-ZT as zone operator terminal: for simple on-site operation of a control zone
- Manual operating selector switches
- Manual operating selector buttons
- Operating of the units via building management system via standardised interfaces:
  – BACnet
  – Modbus IP
  – Modbus RTU

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.
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.
- Pre-programmed data points retrievable via logger function for 1 year

Options for the zone control panel:
- Alarm lamp
- Socket

Per zone:
- The change-over between heating and cooling can be either automatic or manual
  – Cooling lock switch for automatic changeover
  – Heating/cooling switch for manual changeover
- Additional room temperature sensors (max. 3)
- Combination sensor room air quality, temperature and humidity
- Combination sensor fresh air temperature and humidity
- Transfer of actual values and setpoints from external systems (0…10 V; 4 - 20 mA)
- Load shedding input
- Signal for external extract air fan
- Operating selector switches on terminal
- Operating selector button on terminal
- Control of distributor pump, incl. power supply

Power distribution:
- Circuit breakers and output terminals for Hoval indoor climate units
- Safety relay (4-pin)

Options

1 Type code

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

Unit type
TopVent® TP

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)

Design
ST Standard

Air outlet
D1 Design with Air-Injector

Installation
- without
S Suspension set

Filter box
-- without
FK Filter box
FF Flat filter box

Paint finish
-- without
LH Standard paint finish
LU Paint finish as desired

Silencer
-- without
U- Recirculation silencer

Hydraulics
- 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 magnesium zinc sheet and is height-adjustable up to 1300 mm.

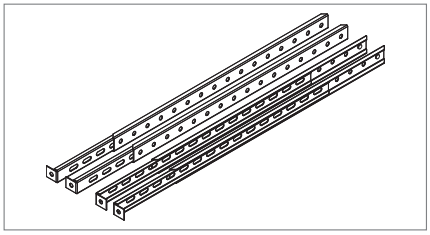


Fig. C1: Suspension set

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.

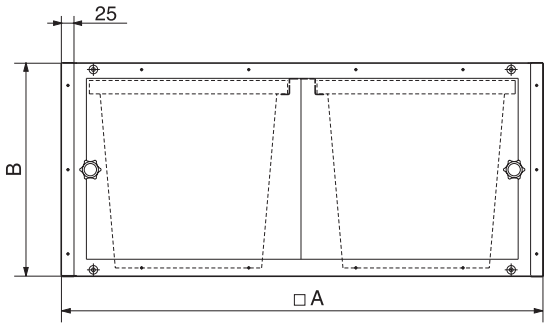
Caution
Risk of fire due to dust in the air. TopVent® TP units with an electric heating coil must always be fitted with a high-temperature filter.

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 magnesium zinc sheet with 2 sliding doors makes it easy to replace the filters.

Notice
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 changed.

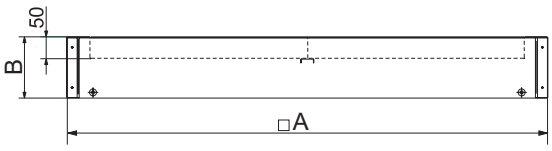


Size			6	9
A		mm	900	1100
B		mm	400	400
Standard	Filter class		ISO coarse 60 % (G4)	
	Weight	kg	20	24
	Factory setting of differential pressure switches	Pa	180	180
High-temperature	Filter class		ISO coarse 55 % (G4)	
	Weight	kg	23	28
	Factory setting of differential pressure switches	Pa	150	150

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 changed.



Size			6	9
A		mm	900	1100
B		mm	140	165
Standard	Filter class		ISO coarse 60 % (G4)	
	Weight	kg	10	12.5
	Factory setting of differential pressure switches	Pa	100	100
High-temperature	Filter class		ISO ePM_{10} 50 % (M5)	
	Weight	kg	14	18.5
	Factory setting of differential pressure switches	Pa	250	250

Table C2: Flat filter box technical data

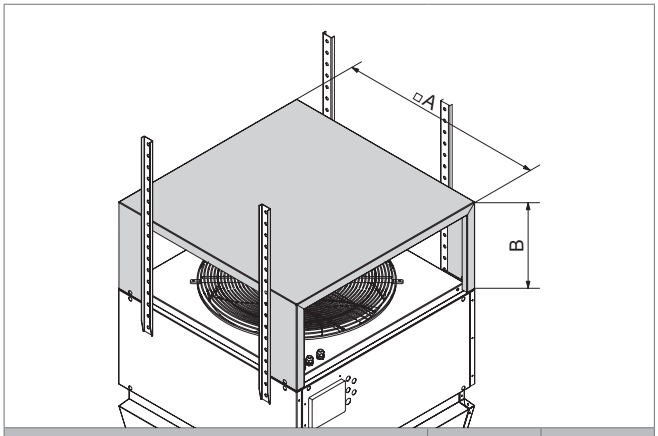
4 Paint finish

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 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
B	mm	380	485
Weight	kg	15	20

Table C3: Recirculation silencer dimensions and weights

6 Hydraulic assembly diverting system

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

Assemblies for hydraulic diverting, which are optimally matched to the units, are available for easy installation of 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.

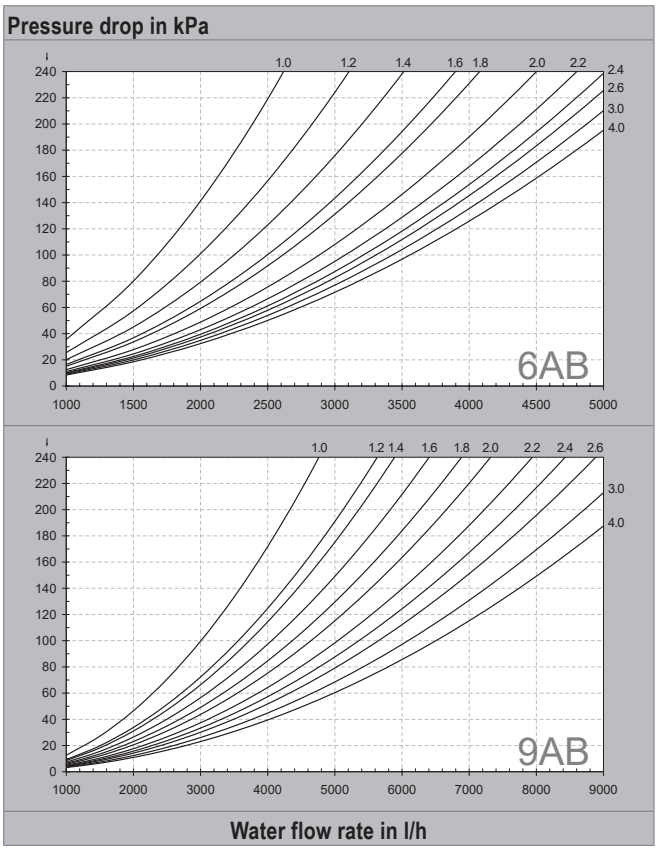
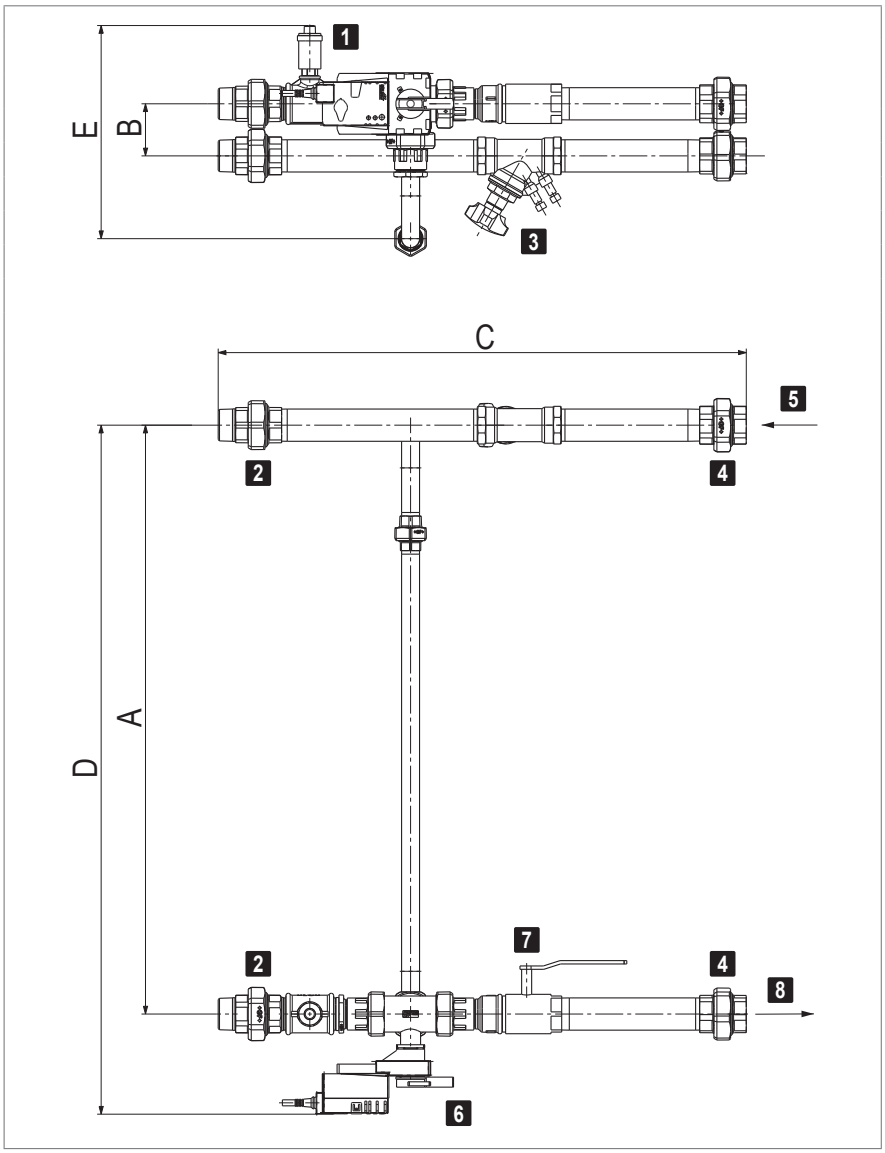


Fig. C2: Default settings for the balancing valves



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: Hydraulic assembly dimensional drawing

Type	A	B	C	D	E	Screw joint	Weight
Y-6AB	758	78	726	904	315	1¼ "	11
Y-9AB	882	78	770	1028	319	1½ "	13

Table C4: Hydraulic assembly dimensions and weights (in mm resp. kg)

Type	Mixing valve	Control valve
Y-6AB	DN20 / kvs 6.3	STAD DN32
Y-9AB	DN25 / kvs 10	STAD DN40

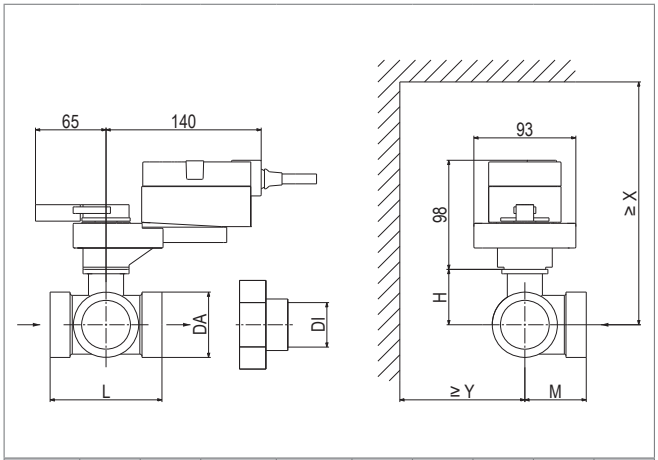
Table C5: Valves of the hydraulic assembly

7 Mixing valve

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

Mixing valves, which are optimally matched to the units, are available for easy installation of 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	DA	DI	L	H	M	X	Y
		m³/h	"	"	mm	mm	mm	mm	mm
M-6AB	20	6.3	G 1¼	Rp ¾	86	46	42	220	90
M-9AB	25	10	G 1½	Rp 1	85	46	45	220	90

Table C6: Mixing valve dimensions

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

Table C7: Mixing valve weights (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 unit. 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
Nominal voltage	V AC	230
Power consumption	kW	0.1
Current consumption	A	0.43

Table C8: Condensate pump technical data

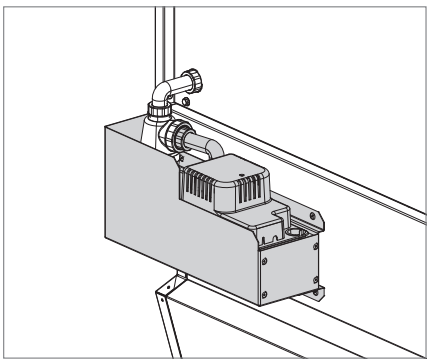


Fig. C4: Condensate pump

9 Return temperature sensor

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

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

10 Pump control

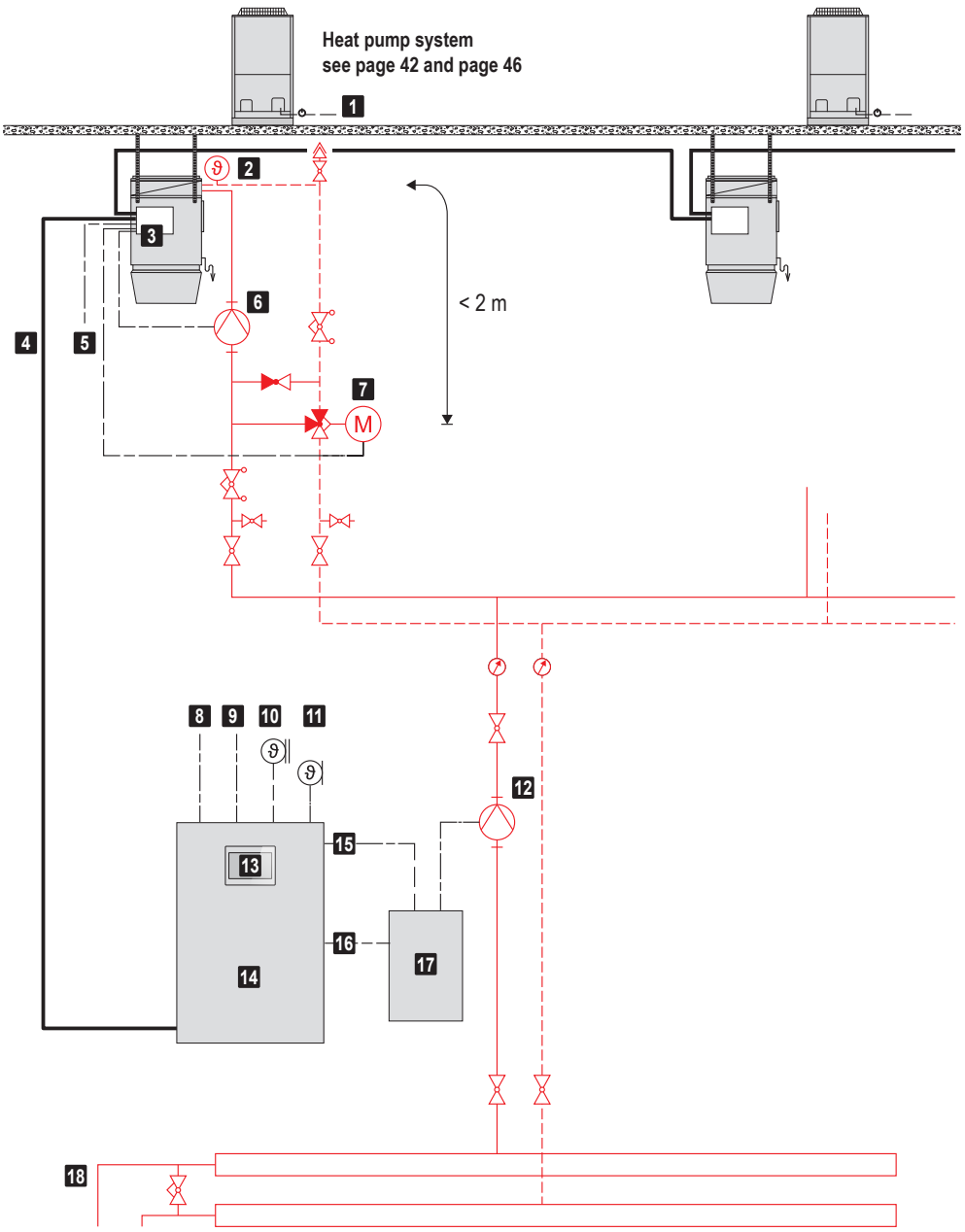
Notice
This option is only available for units with supplementary hot water heater.

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

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

Requirements for mixing valves
- Use 3-way mixing valves with the following flow characteristics:
  - Equal percentage control path
  - Linear bypass
- The valve authority must be ≥ 0.5.
- The maximum run time of the valve actuator is 45 s.
- The valve actuator must be continuous, i.e. the stroke changes in proportion to the control voltage (0…10 VDC or 2…10 VDC).
- The valve actuator must be designed with a position response (0...10 VDC or 2…10 VDC).
- The maximum power consumption is 20 VA.
- Install the valve close to the unit (max. distance 2 m).

Requirements for pumps
- Voltage ..... 230 VAC
- Total current .... max. 4.0 A for all pumps (heating pump, condensate pump)



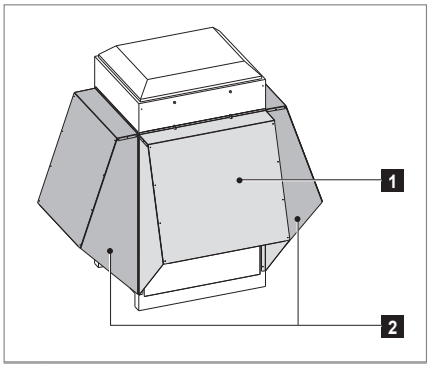
1	Power supply for condensing unit	7	Mixing valve	13	System operator terminal
2	Return temperature sensor (option)	8	Power supply for control panel	14	Zone control panel
3	Unit control box	9	Collective alarm	15	Fault heat supply
4	Power supply for TopVent®	10	Fresh air temperature sensor	16	Heating demand
5	Zone bus	11	Room temperature sensor	17	Heating control panel
6	Heating pump	12	Distributor pump	18	Heating circuit

Table C9: Schematic diagram for TopVent® TP injection system (supplementary heater with hot water)

11 Condensing unit options

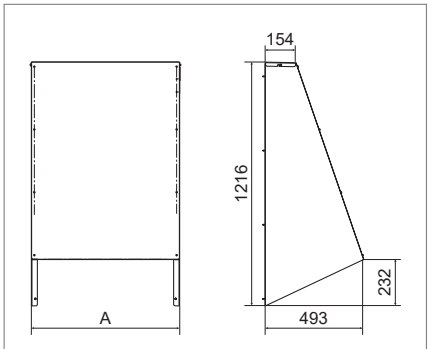
11.1 Protection hood

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. C5: Condensing unit with protection hoods



Dimension	A
Front protection hood	930
Side protection hood	740

Fig. C6: Protection hood dimensions (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.

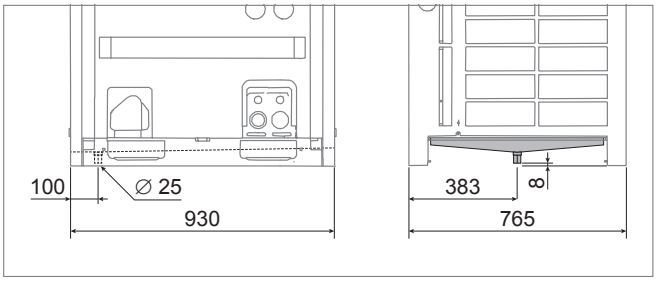


Fig. C7: Condensate drain pan dimensions (in mm)

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 condensing unit and connected in the condensing unit terminal box. Power: 250 W.

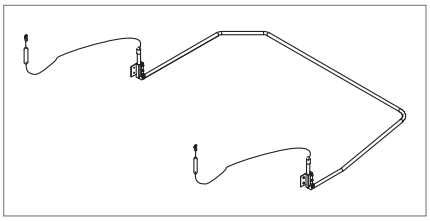


Fig. C8: Heating for condensate drain pan

Transport and installation

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 sensors)
  - 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.

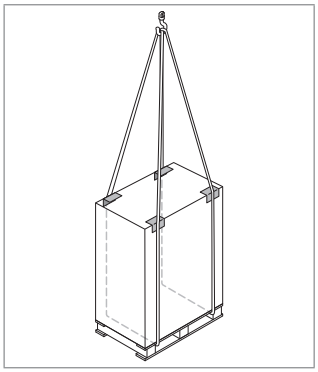


Fig. D1: Lifting with a crane

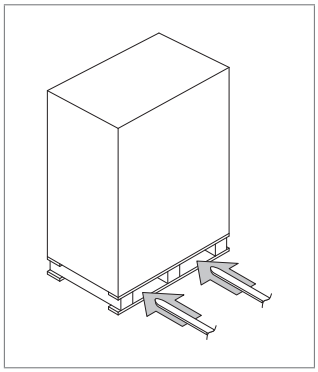
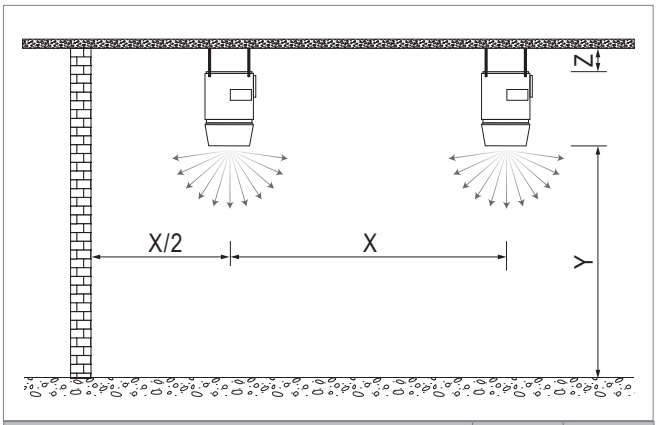


Fig. D2: Lifting with a forklift

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. 1)	m	Approx. 9…25	

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

Table D1: Minimum and maximum distances

Condensing unit

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

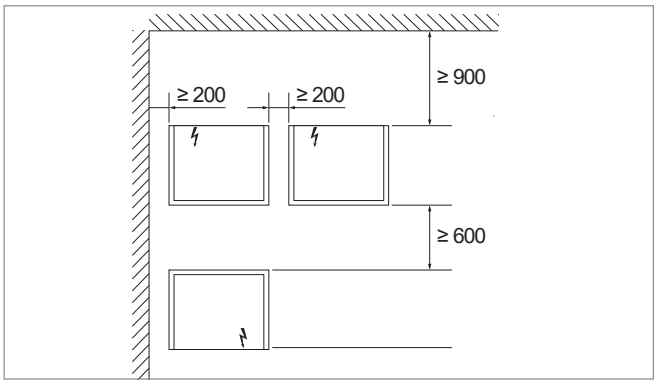


Fig. D3: Space requirements for condensing unit (dimensions in mm)

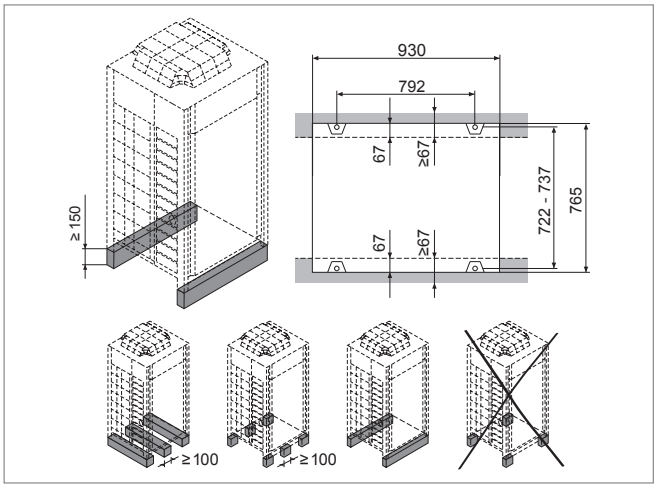


Fig. D4: Frame for condensing unit

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.

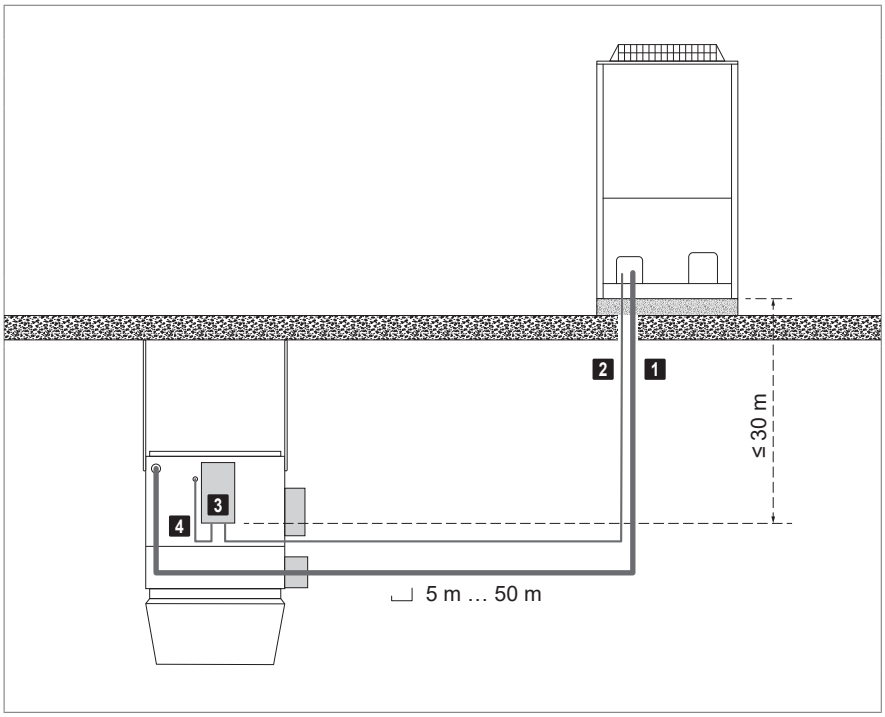
To avoid damaging the unit:
- Do not use any flux.
- Ensure there is a nitrogen supply when soldering.
- Insulate the refrigerant pipes.
- Carry out an air-tightness test and vacuum drying.

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.

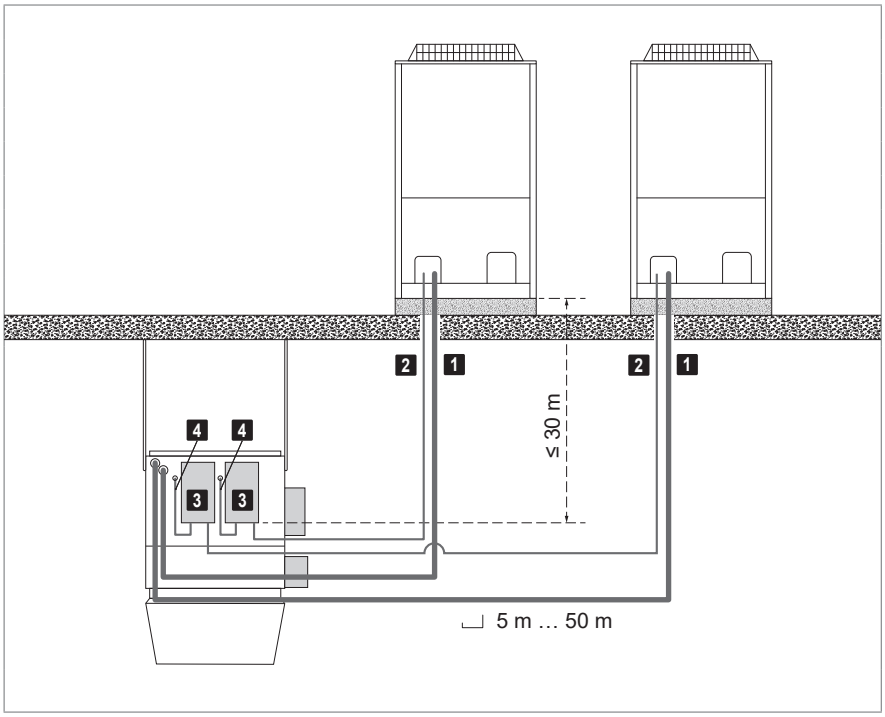
Refrigerant pipes for TopVent® TP with 1 heat pump system



1	Gas line (∅ 22.2 mm)
2	Liquid line (∅ 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 (∅ 22.2 mm)
2	Liquid line (∅ 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.

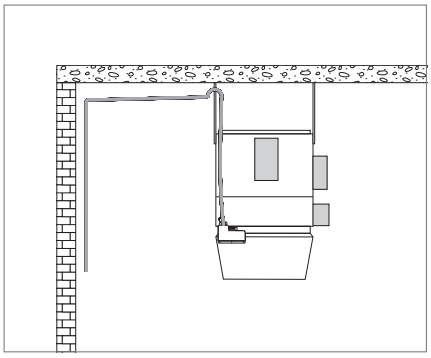


Fig. D7: Condensate line

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.

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

3.2 Hot water heating coil (option)

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

Requirements on the boiler system and the distributor circuit

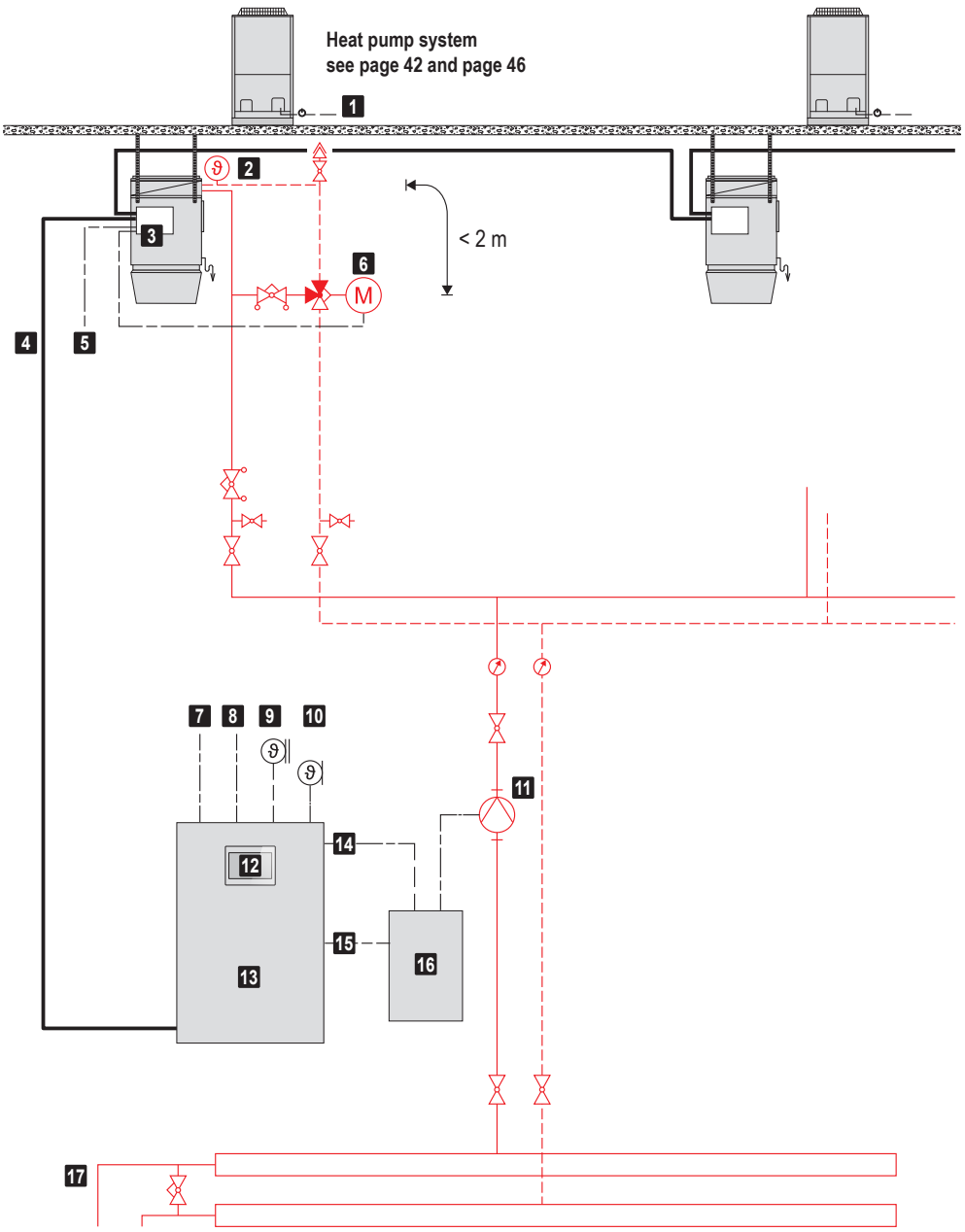
- Hydraulically balance the pipework for the the individual units within a control zone to ensure even distribution.
- The heating medium must be available at the mixing valve without delay in the required amount and temperature.
- Depending on local conditions, check whether compensators for linear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

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

Requirements for mixing valves

- Use 3-way mixing valves with the following flow characteristics:
  - Equal percentage control path
  - Linear bypass
- The valve authority must be ≥ 0.5.
- The maximum run time of the valve actuator is 45 s.
- The valve actuator must be continuous, i.e. the stroke changes in proportion to the control voltage (0…10 VDC or 2…10 VDC).
- The valve actuator must be designed with a position response (0...10 VDC or 2…10 VDC).
- The maximum power consumption is 20 VA.
- Install the valve close to the unit (max. distance 2 m).

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



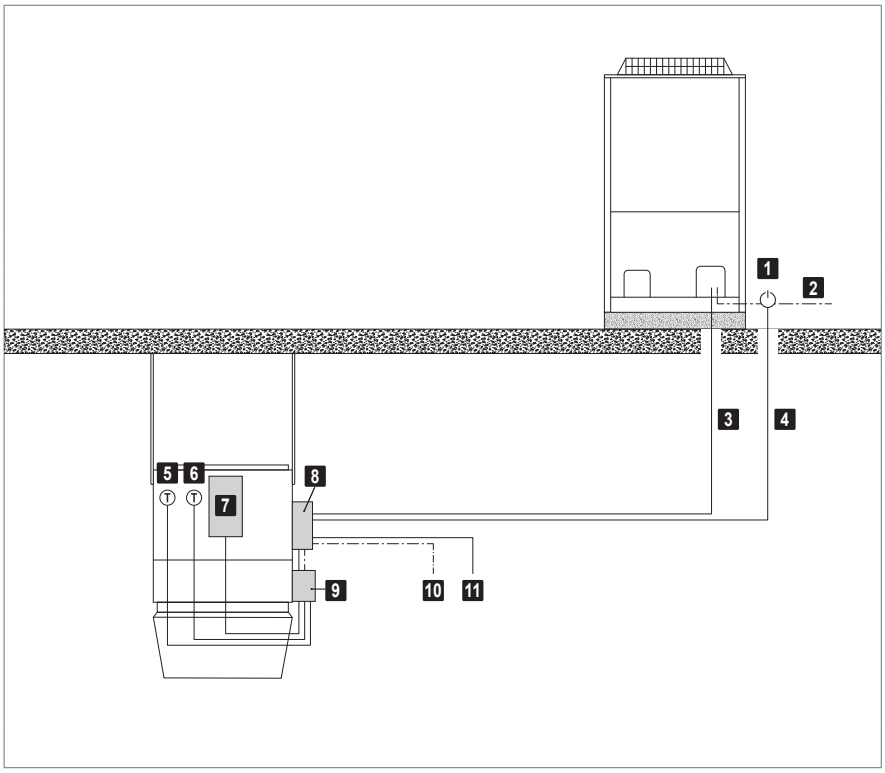
1	Power supply for condensing unit	7	Power supply for control panel	13	Zone control panel
2	Return temperature sensor (option)	8	Collective alarm	14	Fault heat supply
3	Unit control box	9	Fresh air temperature sensor	15	Heating demand
4	Zone bus	10	Room temperature sensor	16	Heating control panel
5	Power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

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.
- 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).

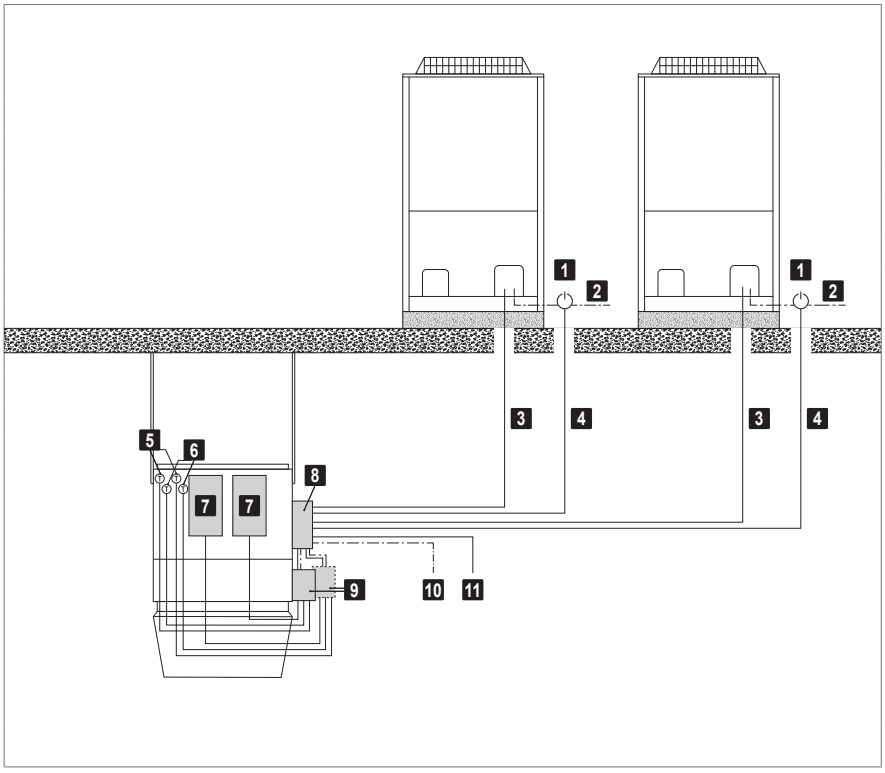
Electrical installation for TopVent® TP with 1 heat pump system



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

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

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

Component	Designation	Voltage	Cable		Comments	Start	Target
TopTronic® C System control Zone control panel	Power supply	3 × 400 VAC	NYM-J	5 × … mm²		On-site	Zone control panel
		1 × 230 VAC	NYM-J	3 × … mm²		On-site	Zone control panel
	Zone bus		J-Y(ST)Y	2 × 2 × 0.8 mm	max. 500 m length	Zone control panel	Hoval units
	System bus		Ethernet	≥ CAT 5	For connecting several zone control panels	Zone control panel	Further zone control panel
	Integration into the building management system		Ethernet	≥ CAT 5	BACnet, Modbus IP	Zone control panel	On-site (BMS)
			J-Y(ST)Y	2 × 2 × 0.8 mm	Modbus RTU	Zone control panel	On-site (BMS)
	Room temperature sensor		J-Y(ST)Y	2 × 2 × 0.8 mm	max. 250 m	Zone control panel	Sensors
	Additional room temperature sensors		J-Y(ST)Y	2 × 2 × 0.8 mm	max. 250 m	Zone control panel	Sensors
	Combination sensor room air quality, temperature and humidity		J-Y(ST)Y	4 × 2 × 0.8 mm	max. 250 m	Zone control panel	Sensors
	Fresh air temperature sensor		J-Y(ST)Y	2 × 2 × 0.8 mm	max. 250 m	Zone control panel	Sensors
	Combination sensor fresh air temperature and humidity		J-Y(ST)Y	2 × 2 × 0.8 mm	max. 250 m	Zone control panel	Sensors
	Heating demand	Volt-free max. 250 VAC max. 24 VDC	NYM-O	2 × 1.5 mm²	max. 8 A	Zone control panel	On-site
	Setpoint heating demand	2-10 V DC	J-Y(ST)Y	2 × 2 × 0.8 mm	max. 250 m	Zone control panel	On-site
	Fault heat supply	24 VAC	NYM-O	2 × 1.5 mm²	max. 1 A	On-site	Zone control panel
	Collective alarm	Volt-free max. 230 VAC max. 24 VDC	NYM-O	2 × 1.5 mm²	max. 3 A max. 2 A	Zone control panel	On-site
	Distributor pump heat supply	3 × 400 VAC	NYM-J	4 × 1.5 mm² (min.)	Power supply 3-phase, max. 6 A	Zone control panel	Pump
		1 × 230 VAC	NYM-J	3 × 1.5 mm² (min.)	Power supply 1-phase, max. 6 A	Zone control panel	Pump
			NYM-O	4 × 1.5 mm²	Control line	Zone control panel	Pump
	Power supply for units	3 × 400 VAC	NYM-J	5 × 1.5 mm² (min.)	RoofVent® size 6	Zone control panel or on-site	Hoval units
		3 × 400 VAC	NYM-J	5 × 4.0 mm² (min.)	RoofVent® size 9		
		3 × 400 VAC	NYM-J	5 × 1.5 mm² (min.)	TopVent®		
	Power supply for condensing unit	3 × 400 VAC	NYM-J	5 × 4.0 mm² (min.)		Zone control panel or on-site	Condensing units
	Power supply for electric heating coil	3 × 400 VAC	NYM-J	4 × 4.0 mm² (min.)	S type size 6, R type size 9	Zone control panel or on-site	Hoval units
		3 × 400 VAC	NYM-J	4 × 10.0 mm² (min.)	S type size 9		
	System operator terminal (if external)	24 V DC	NYM-J	3 × 1.5 mm²	Power supply 0.42 A	Zone control panel	System operator terminal
			Ethernet	≥ CAT 5	Communication	Zone control panel	System operator terminal
	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	Zone control panel	Zone operator terminal
	External sensor values	0-10 V DC	J-Y(ST)Y	2 × 2 × 0.8 mm		On-site	Zone control panel
	External set values	0-10 V DC	J-Y(ST)Y	2 × 2 × 0.8 mm		On-site	Zone control panel
	Load shedding input	24 VAC	NYM-O	2 × 1.5 mm²	max. 1 A	On-site	Zone control panel

Component	Designation	Voltage	Cable	Comments	Start	Target
	Operating selector switch on terminal (analogue)	0-10 V DC	J-Y(ST)Y 2 × 2 × 0.8 mm		On-site (switch)	Zone control panel
	Operating selector switch on terminal (digital)	0-10 V DC	J-Y(ST)Y 6 × 2 × 0.8 mm		On-site (switch)	Zone control panel
	Operating selector button on terminal	24 V AC	J-Y(ST)Y 6 × 2 × 0.8 mm		On-site (button)	Zone control panel
	Forced off	24 V AC	NYM-O 2 × 1.5 mm²	max. 1 A	On-site	Zone control panel
TopVent® unit	Power supply	3 × 400 V AC	NYM-J 5 × 1.5 mm² (min.)		Zone control panel or on-site	TopVent® unit
	Zone bus		J-Y(ST)Y 2 × 2 × 0.8 mm	max. 500 m length	Zone control panel	TopVent® unit
	Mixing valve heating	24 V AC	NYM-O 4 × 1.0 mm²	with Hydraulic assembly or Mixing valve option: cable connected to the mixing valve	TopVent® unit	Valve
	Heating pump	230 V AC	NYM-J 3 × 1.5 mm²	Power supply	TopVent® unit	Pump
		24 V AC	NYM-O 4 × 1.0 mm²	Control line	TopVent® unit	Pump
	Power supply for electric heating coil	3 × 400 V AC	NYM-J 4 × 4.0 mm² (min.)	S type size 6, R type size 9	Zone control panel or on-site	TopVent® unit
		3 × 400 V AC	NYM-J 4 × 10.0 mm² (min.)	S type size 9		
Condensing unit (2 × for TP-9-M)	Power supply	3 × 400 V AC	NYM-J 5 × 4.0 mm² (min.)		Zone control panel or on-site	Condensing unit
	Communication TopVent®		J-Y(ST)Y 4 × 2 × 0.8 mm		TopVent® unit	Condensing unit
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)	On-site (main switch)	TopVent® unit

Cable list for on-site connections

System design

1 Design example

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

Design data		Example
■ Hall geometry (L × W × H) ■ Internal heat gains (machines, lighting, etc.) ■ Heating and cooling with decentralised heat pump ■ Optimisation of the ventilation quality (no limitation on the number of units)		46 × 40 × 9 m 23 kW → Unit type TP → Unit size 6
Design conditions heating:	■ Fresh air temperature ■ Room temperature ■ Extract air conditions ■ Fabric heat losses	- 20 °C 16 °C 18 °C 93 kW
Design conditions cooling:	■ Fresh air temperature ■ Room temperature ■ Extract air temperature ■ Transmission sensible gains	32 °C 26 °C / 40 %rh 28 °C 57 kW
Number of units ■ Calculate the required number of units: n = base area / floor area covered		n = (46 × 40) / 537 = 3.4 → 4 units (size 6)
Type of heating coil ■ Calculate the required heat output for coverage of fabric heat losses per unit: Q_{H_req} = (fabric heat losses – internal heat loads) / n ■ Use the 'Hoval HK-Select' selection program to calculate the heat output for coverage of fabric heat losses under the given design conditions and select the suitable coil type.		(93 – 23) / 4 = 17.5 kW per unit TP-6-K: 20.0 kW → Heating/cooling coil type K
Type of cooling coil ■ Calculate the required cooling capacity for coverage of transmission sensible gains per unit: Q_{C_req} = (transmission sensible gains + internal heat loads) / n ■ Use the 'Hoval HK-Select' selection program to calculate the cooling capacity for coverage of transmission sensible gains under the given design conditions and select the suitable coil type.		(57 + 23) / 4 = 20.0 kW per unit TP-6-K: 21.5 kW → Heating/cooling coil type K

Checks	
■ Effective heat output $Q_{H\_effective}$ = Output for coverage of fabric heat losses × n	20.0 × 4 = 80.0 kW 80.0 kW > (93 – 23) kW → OK
■ Mounting height Calculate the actual mounting height (= distance between the floor and the bottom edge of the unit) and compare with the minimum and maximum mounting height. Y = Hall height – distance from ceiling – unit height	9000 – 1375 – 300 = 7325 mm Y_{min} = 4.0 m < 7.33 m → OK Y_{max} = 16.4 m > 7.33 m → OK
■ Effective cooling capacity $Q_{c\_effective}$ = Output for coverage of transmission sensible gains × n	21.5 × 4 = 86.0 kW 86.0 kW > (57 + 23) kW → OK
■ Minimum and maximum clearances Determine the positioning of the units according to the number of units and the base area of the hall; check the minimum and maximum clearances.	n = 4 = 2 × 2 Unit clearance in length: X = 46 / 2 = 23 m X_{max} = 23 ≥ 23 m X_{min} = 12 ≤ 23 m → OK Unit clearance in width: X = 40 / 2 = 20 m X_{max} = 23 ≥ 20 m X_{min} = 12 ≤ 20 m → OK

2 Maintenance schedule

Activity	Interval
Renew 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 E1: Maintenance schedule

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

Information about the hall

Application		Length	
Type		Width	
Insulation		Height	

Is the roof strong enough?	○ yes	○ no			
Are there window areas?	○ yes	○ no	Percentage?		
Is there a crane?	○ yes	○ no	Height?		
Is there enough space for installation and servicing?	○ yes	○ no			
Are there any voluminous installations or machines?	○ yes	○ no			
Are pollutants present?	○ yes	○ no	Which?		
– If yes, are they heavier than air?	○ yes	○ no			
Is oil contained in the extract air?	○ yes	○ no			
Is dust present?	○ yes	○ no	Dust level?		
Is there high humidity?	○ yes	○ no	How much?		
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.

Hoval

As a specialist in heating and climate technology, Hoval is your experienced partner for system solutions. For example, you can heat water with the sun's energy and your rooms with oil, gas, wood or a heat pump. Hoval ties together the various technologies and also integrates room ventilation into the system. So you can save energy while looking after the environment and your costs – and still enjoy the same level of comfort.

Hoval is one of the leading international companies for indoor climate solutions. More than 75 years of experience continuously motivate us to design innovative system solutions. We manufacture 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

United Kingdom
Hoval Ltd.
Northgate, Newark
Nottinghamshire
NG24 1JN
hoval.co.uk

Your Hoval partner

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