Hoval

Indoor Climate Systems

Hoval RoofVent® RP

Design handbook

Supply and extract air handling 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

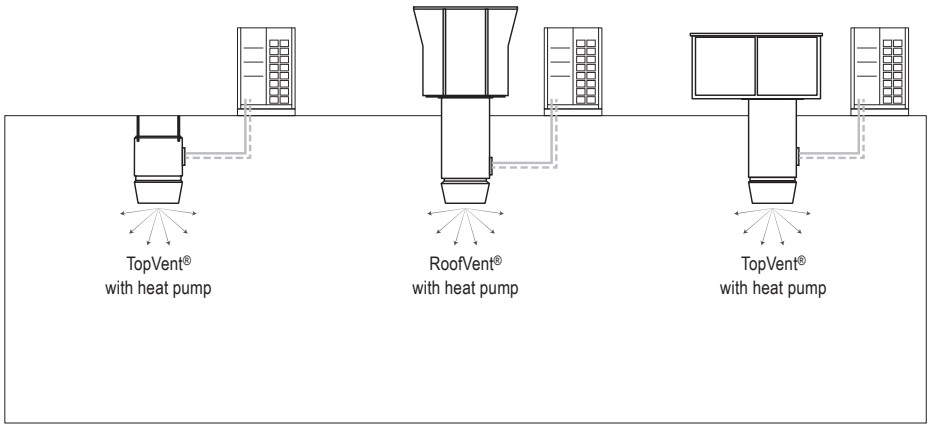
The number of supply and extract air handling units depends on how much fresh air is required in order to create a comfortable atmosphere for people in the building. Recirculation units cover additional heat or cool demand as required. A broad range of unit types and sizes with heating and cooling coils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

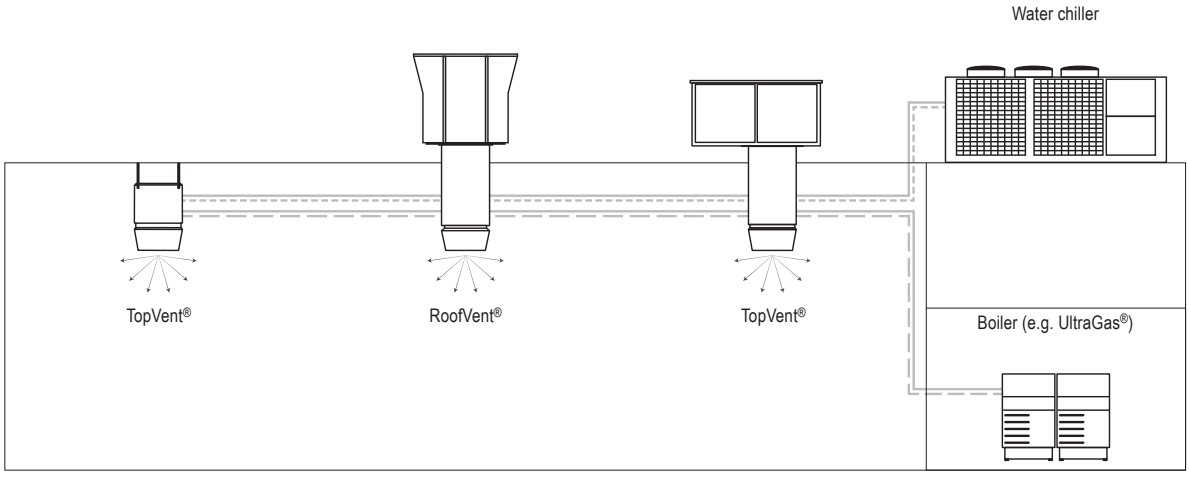
Control with specialist expertise
The TopTronic® C control system, which was specifically developed for Hoval indoor climate systems, regulates the separate units individually and controls them based on zones. This enables optimal adjustment to the local requirements of the different usage areas in the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

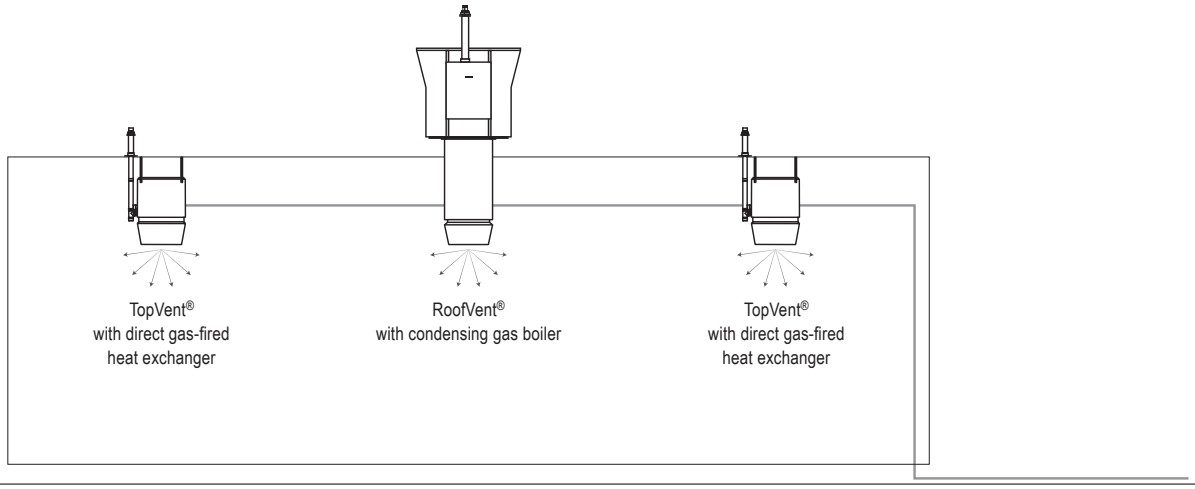
System with decentralised heat and cold generation with heat pump



System with central heat and cold generation



System with decentralised, gas-fired heat generation



RoofVent® RP

Supply and extract air handling 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

RoofVent® RP units are supply and extract air handling units for heating and cooling spaces up to 25 m in height with decentralised heat pump. They have the following functions:

- Fresh air supply
- Extract air removal
- Heating and cooling with heat pump
- Energy recovery with highly efficient plate heat exchanger
- Filtering of the fresh air and the extract air
- Air distribution and destratification with adjustable Air-Injector

The RoofVent® RP unit complies with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of ventilation systems. It is a system of the «non-residential ventilation unit» (NRVU) and «bidirectional ventilation unit» (BVU) type, provided for in Commission Regulation (EU) 1253/2014.

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 RoofVent® RP unit consists of the following components:

Roof unit with energy recovery
The self-supporting housing for mounting on the roof frame is of double-shell construction; this ensures good thermal insulation and high stability. The roof unit includes:

- the fans
- the air filters
- the plate heat exchanger with control dampers
- the control block

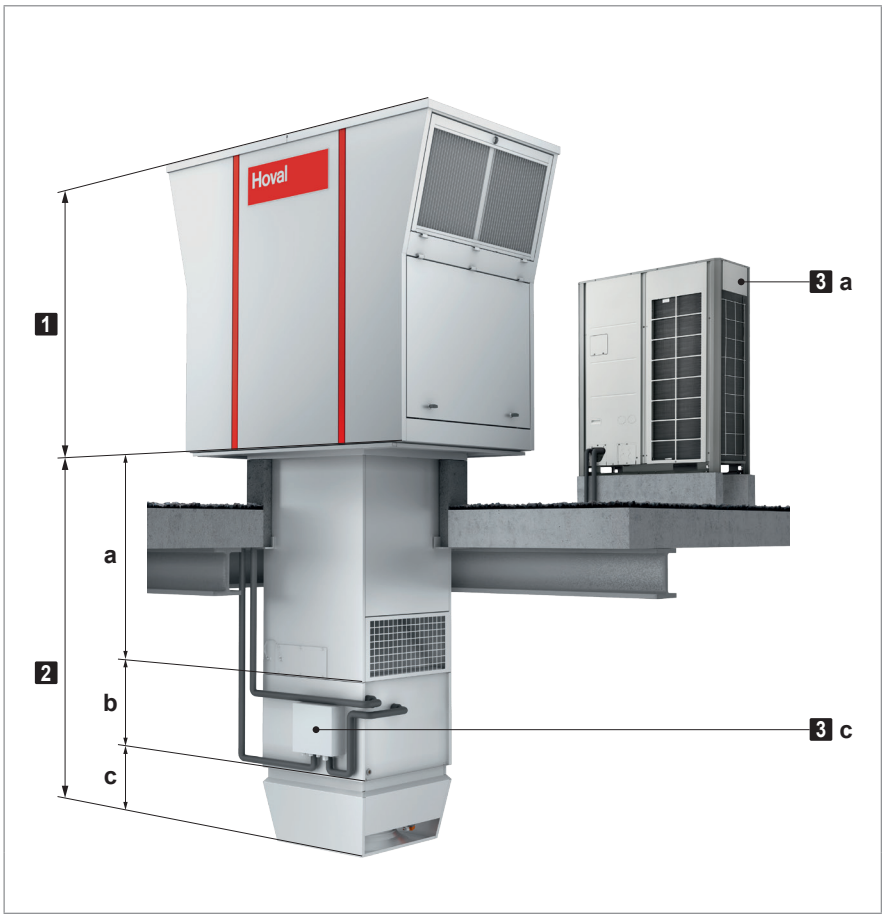
All components are easily accessible for maintenance work through large access openings.

Below-roof unit
The below-roof unit comprises the following components:

- Connection module:
  The connection module serves as an air duct through the roof and for drawing in extract air from the hall through the extract air grille. To enable easy adaptation to local installation conditions, the connection module is available in 4 lengths. It also contains the electrical connection box of the below-roof unit. This has a direct plug connection to the control block in the roof unit via the wiring harness.
- Heating/cooling section
  The heating cooling section contains the following components:
  – Heating/cooling coil for heating and cooling the supply air
  – Condensate separator
- 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.

Heat pump system
The reversible air/air heat pump system in split design generates both heat and cold decentrally. It consists of the following components:

- Heat pump with continuously modulating inverter technology for precise output control and high efficiency
- Communication kit for communication between heat pump, expansion valve and indoor climate unit (mounted in the roof unit)
- EEV kit with expansion valve (supplied loose for on-site installation on the below-roof unit)
- Branch joint kit (only for heat pump Q)

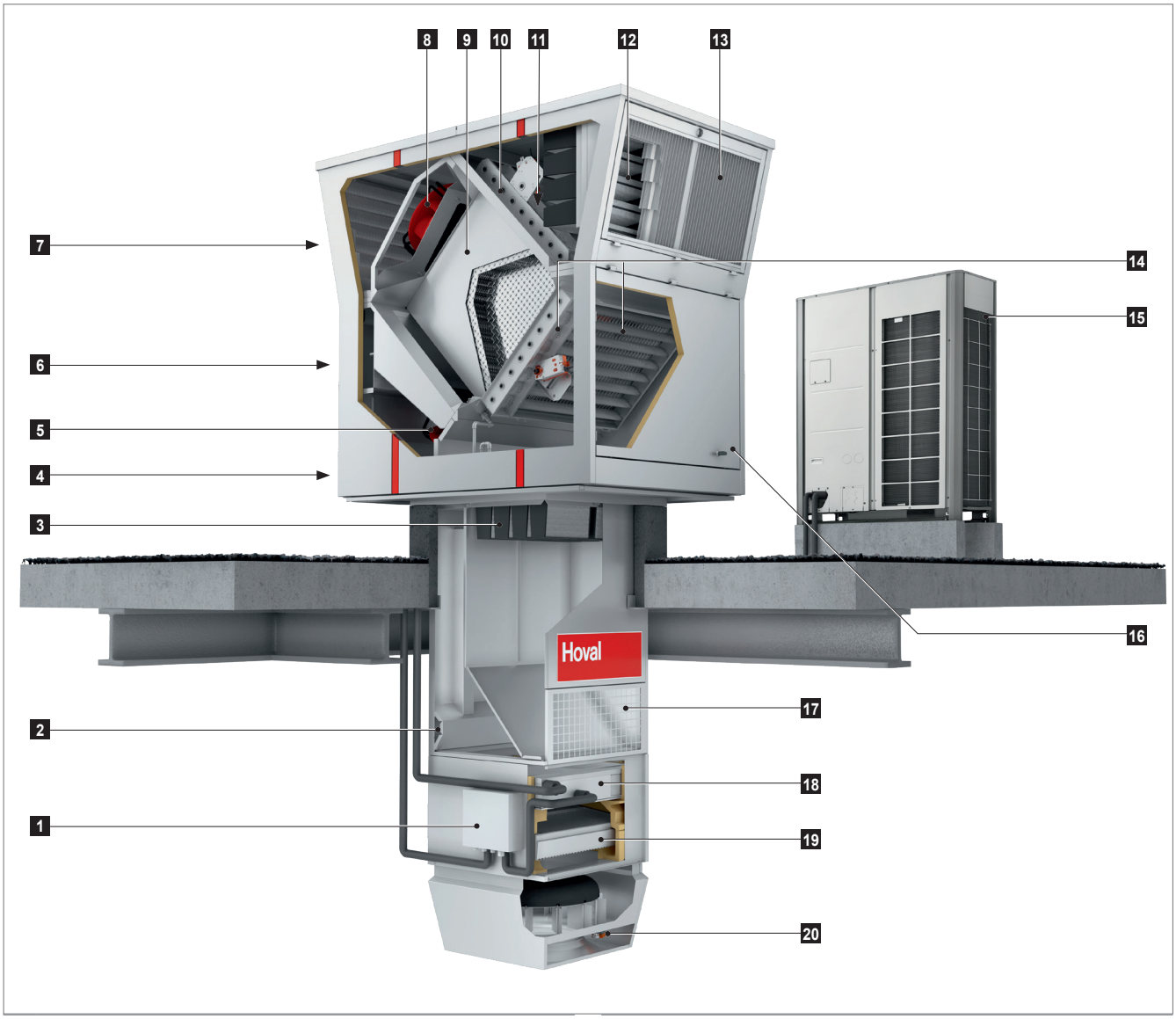


1 Roof unit with energy recovery
2 Below-roof unit
- **a** Connection module
- **b** Heating/cooling section
- **c** Air-Injector

3 Heat pump system
- **a** Heat pump
- **b** Communication kit (mounted in the roof unit)
- **c** EEV kit

Fig. B1: RoofVent® RP components

Notice
The picture only shows the schematic layout. In contrast to the illustration here, the EEV kit is located on the refrigerant connection side.



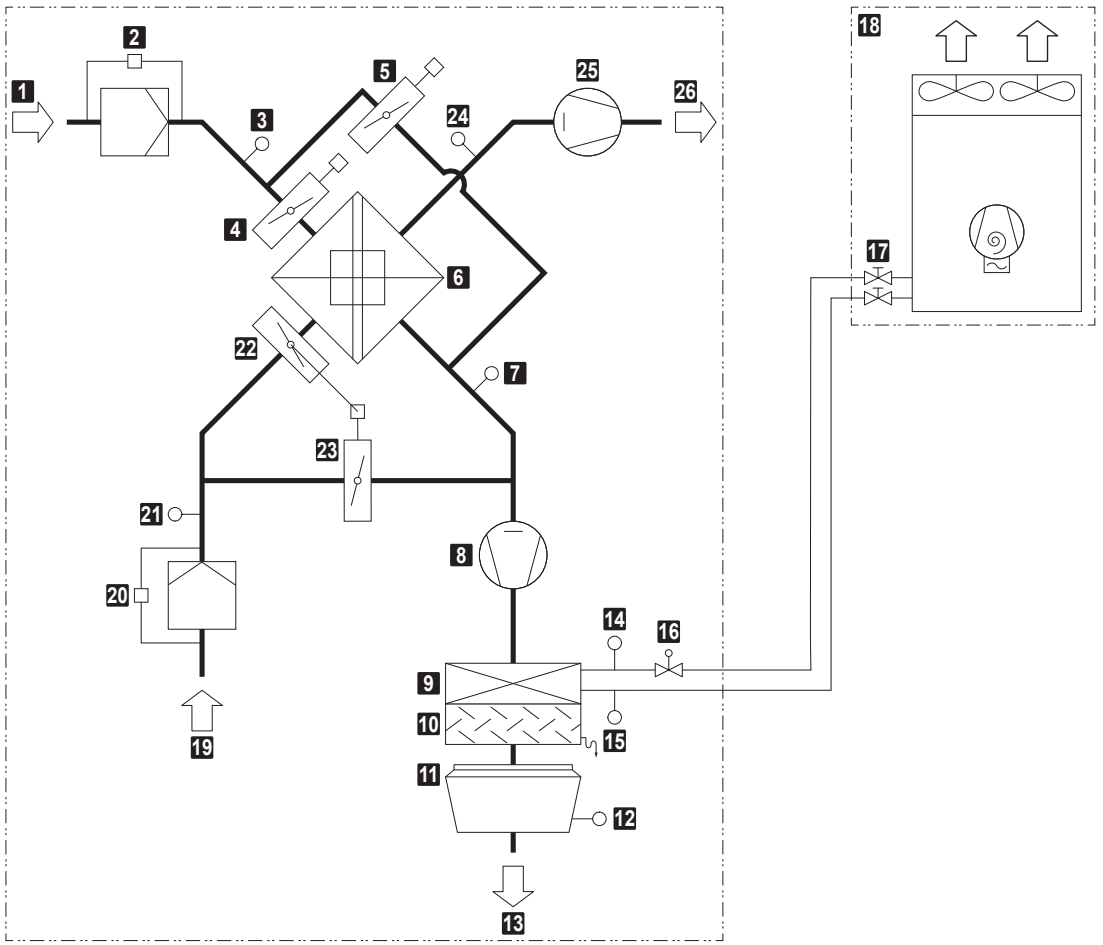
1	EEV kit with expansion valve	11	Fresh air damper with actuator
2	Connection box	12	Fresh air filter
3	Extract air filter	13	Fresh air access door
4	Supply air access door	14	Extract air and recirculation dampers with actuator
5	Supply air fan	15	Heat pump
6	Control block with communication kit	16	Extract air access door
7	Exhaust air access door	17	Extract air grille
8	Exhaust air fan	18	Heating/cooling coil
9	Plate heat exchanger with bypass (for performance control and as recirculation bypass)	19	Condensate separator
10	Bypass damper with actuator	20	Actuator Air-Injector

Fig. B2: RoofVent® RP construction

Notice
The picture only shows the schematic layout. In contrast to the illustration here, the EEV kit is located on the refrigerant connection side.

2.2 Function

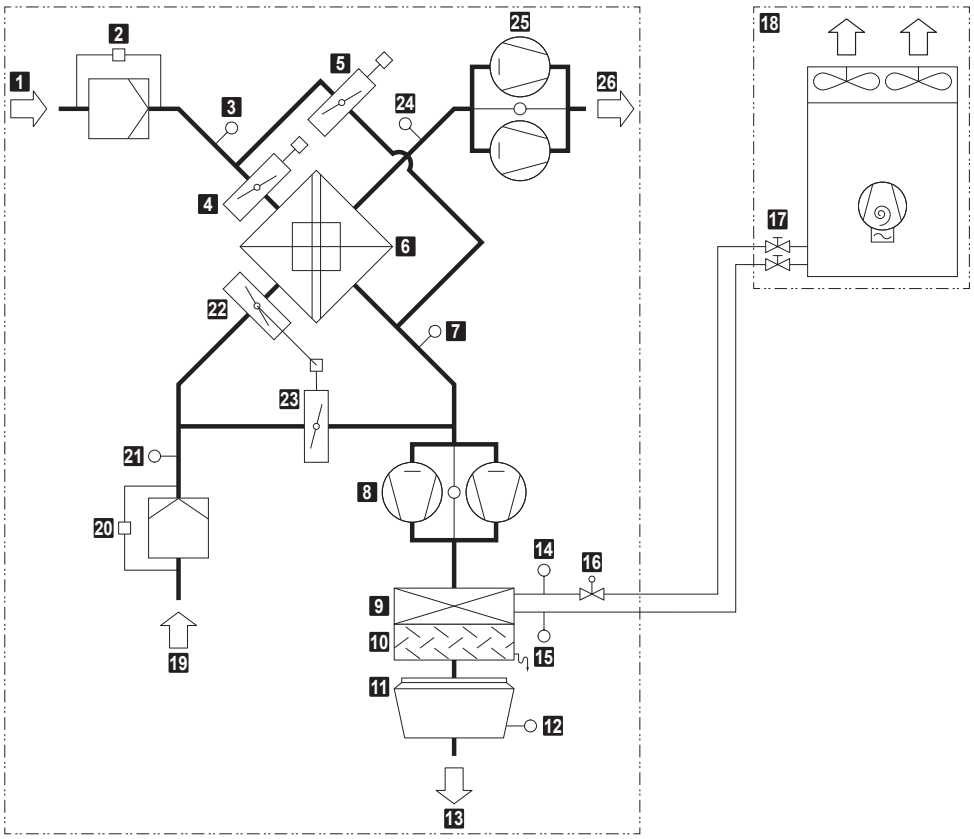
RoofVent® RP-6-P



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

Table B1: RoofVent® RP-6-P function diagram

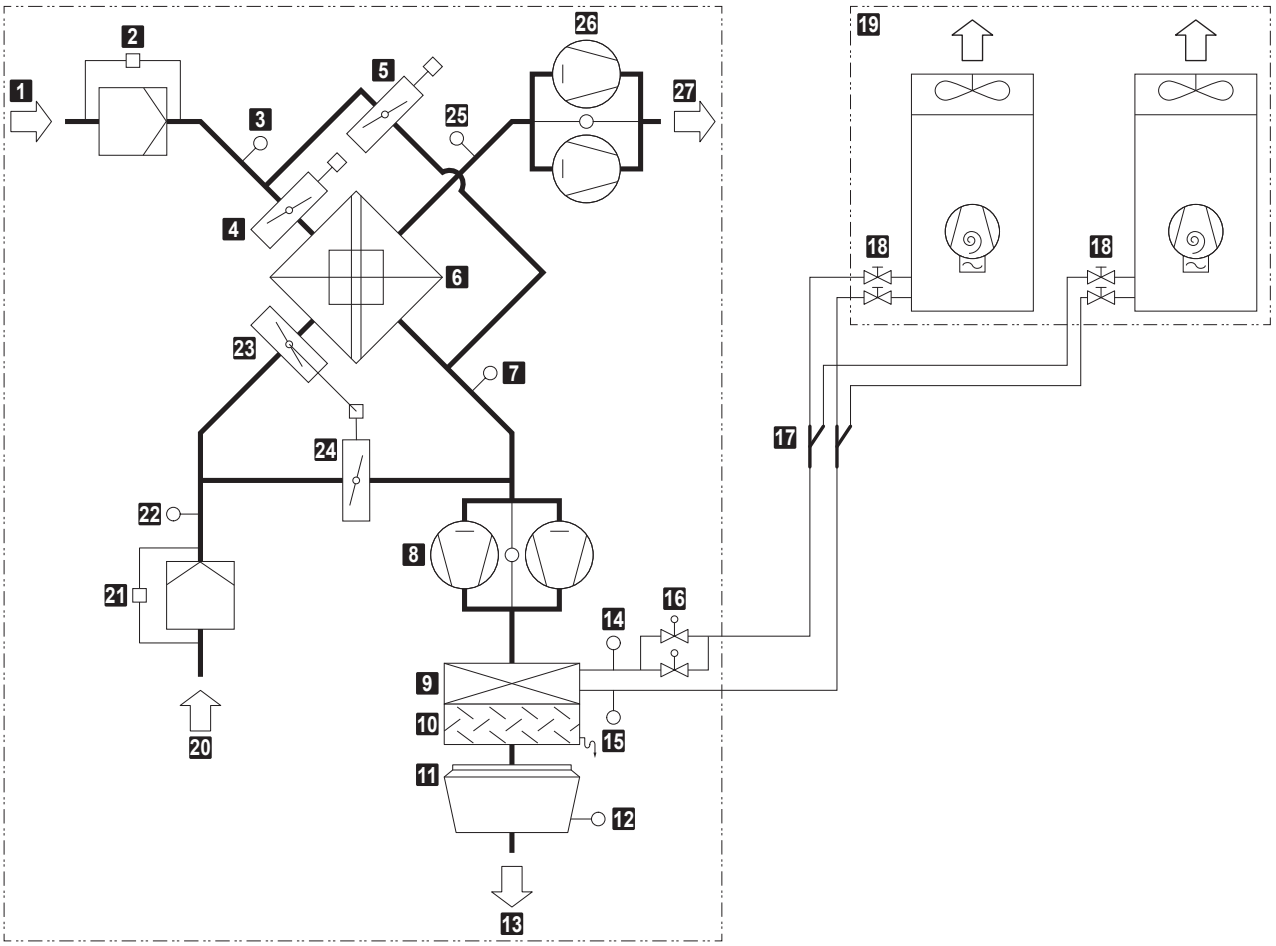
RoofVent® RP-9-P



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

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

RoofVent® RP-9-Q



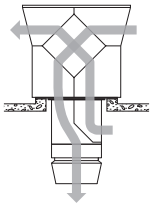
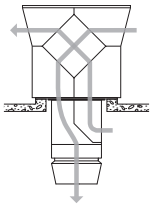
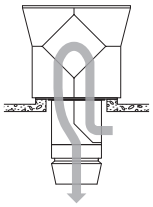
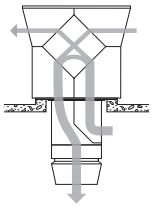
1	Fresh air	15	Gas temperature sensor (supplied loose)
2	Fresh air filter with differential pressure switch	16	Expansion valves (supplied loose in the EEV kit)
3	Temperature sensor air inlet ER (optional)	17	Branch joint kit Q (supplied loose)
4	Fresh air damper with actuator	18	Shut-off valves
5	Bypass damper with actuator	19	Heat pump Q (cascade)
6	Plate heat exchanger	20	Extract air
7	Temperature sensor air outlet ER (optional)	21	Extract air filter with differential pressure switch
8	Supply air fans with flow monitoring	22	Extract air temperature sensor
9	Heating/cooling coil	23	Extract air damper with actuator
10	Condensate separator	24	Recirculation damper (opposed to the extract air damper)
11	Air-Injector with actuator	25	Exhaust air temperature sensor
12	Supply air temperature sensor	26	Exhaust air fans with flow rate monitoring
13	Supply air	27	Exhaust air
14	Liquid temperature sensor (supplied loose)		

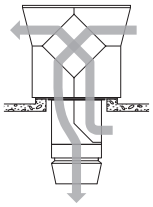
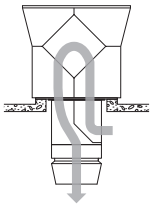
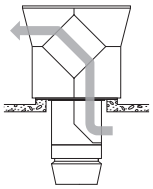
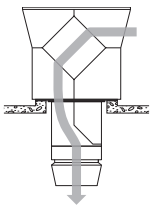
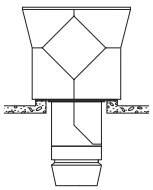
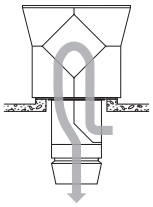
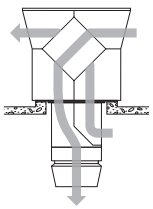
Table B3: RoofVent® RP-9-Q function diagram

2.3 Operating modes

The RoofVent® RP has the following operating modes:
- Ventilation
- Ventilation (reduced)
- Air quality
- Recirculation
- Exhaust air
- Supply air
- Standby

The TopTronic® C control system regulates these operating modes automatically for each control zone in accordance with the specifications in the calendar. The following points also apply:
- The operating mode of a control zone can be switched over manually.
- Each RoofVent® unit can operate individually in a local operating mode: Off, Recirculation, Supply air, Exhaust air, Ventilation.

Code	Operating mode		Description
VE	**Ventilation** The unit blows fresh air into the room and exhausts polluted room air. The room temperature set value day is active. Depending on the temperature conditions, the system continuously controls: ■ the energy recovery ■ the heating/cooling		Supply air fan ..... on [1)] Exhaust air fan ..... on [1)] Energy recovery ..... 0-100 % Extract air damper ..... open Recirculation damper ..... closed Heating/cooling ..... 0-100 % [1)] Adjustable flow rate
VEL	**Ventilation (reduced)** As VE, but the unit only operates with the set minimum values for the supply and exhaust air volumes		Supply air fan ..... MIN Exhaust air fan ..... MIN Energy recovery ..... 0-100 % Extract air damper ..... open Recirculation damper ..... closed Heating/cooling ..... 0-100 %
AQ	**Air quality** This is the operating mode for demand-controlled ventilation of the room. The room temperature set value day is active. Depending on the temperature conditions, the system continuously controls: ■ the energy recovery ■ the heating/cooling Depending on the room air quality or room air humidity, the system operates in one of the following operating states:		
AQ_REC	■ Air quality Recirculation: When air quality is good and air humidity appropriate, the unit heats or cools in recirculation operation.		Like REC
AQ_ECO	■ Air quality Mixed air: When ventilation requirements are medium, the unit heats or cools in mixed air operation. The supply and exhaust air volume is based on the air quality.		Supply air fan ..... MIN-MAX Exhaust air fan ..... MIN-MAX Energy recovery ..... 0-100 % Extract air damper ..... 50 % Recirculation damper ..... 50 % Heating/cooling ..... 0-100 %

AQ_VE	■ Air quality Ventilation: When ventilation requirements are high or the room air humidity is too high, the unit heats or cools in pure ventilation operation. The supply and exhaust air volume is based on the air quality.		Supply air fan ..... MIN-MAX Exhaust air fan ..... MIN-MAX Energy recovery ..... 0-100 % Extract air damper ..... open Recirculation damper ..... closed Heating/cooling ..... 0-100 %
REC	**Recirculation** On/Off recirculation operation with TempTronic algorithm: During heat or cool demand, the unit draws in room air, heats or cools it and blows it back into the room. The room temperature set value day is active. The flow rate is controlled in 2 stages.		Supply air fan ..... 0 / MIN / MAX [1] Exhaust air fan ..... off Energy recovery ..... 0 % Extract air damper ..... closed Recirculation damper ..... open 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 demand (either in permanent operation or in on/off operation depending on the temperature stratification, as desired).		
EA	**Exhaust air** The unit extracts spent room air. There is no room temperature control. Unfiltered fresh air enters the room through open windows and doors or another system provides air supply.		Supply air fan ..... off Exhaust air fan ..... on [1] Energy recovery ..... 0 % Extract air damper ..... open Recirculation damper ..... closed Heating/cooling ..... off [1] Adjustable flow rate
SA	**Supply air** The unit blows fresh air into the room. The room temperature set value day is active. Depending on the temperature conditions, the system controls the heating/cooling. Spent room air passes through open windows and doors or another system provides extraction.		Supply air fan ..... on [1] Exhaust air fan ..... off Energy recovery ..... 0 % [2] Extract air damper ..... open Recirculation damper ..... closed Heating/cooling ..... 0-100 % [1] Adjustable flow rate [2] Fresh air and bypass dampers are open
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.		Supply air fan ..... MAX Exhaust air fan ..... off Energy recovery ..... 0 % Extract air damper ..... closed Recirculation damper ..... open Heating/cooling ..... on
OPR	■ Overheating protection: If the room temperature rises above the set value for overheating protection, the unit cools down the room in recirculation operation. If the temperatures also permit fresh air cooling, the unit automatically switches to night cooling (NCS) to save energy.		
NCS	■ Night cooling: If the room temperature exceeds the set value for night cooling and the current fresh air temperature permits it, the unit blows cool fresh air into the room and extracts warmer room air.		Supply air fan ..... on [1] Exhaust air fan ..... on [1] Energy recovery ..... 0 % Extract air damper ..... open Recirculation damper ..... closed Heating/cooling ..... off [1] Adjustable flow rate

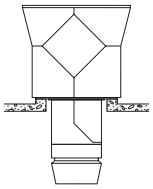
L_OFF	**Off** (local operating mode) The unit is switched off; frost protection remains active.		Supply air fan ..... off Exhaust air fan ..... off Energy recovery ..... 0 % Extract air damper ..... closed Recirculation damper ..... open Heating/cooling ..... off

Table B4: RoofVent® RP operating modes

3 Technical data

3.1 Type code

RP - 6 - P ...

Unit type
RoofVent® RP

Unit size
6 or 9

Heating/cooling section
P with coil type P for heat pump P
Q with coil type Q for heat pump Q (only for size 9)

Further options

Table B5: Type code

3.2 Application limits

Heating mode				
Fresh air temperature (WB)		min.	°C	−25
		max.	°C	18
Air inlet temperature to the heating/cooling coil (DB)		min.	°C	5
		max.	°C	24
Cooling mode				
Fresh air temperature (DB)		min.	°C	−10
		max.	°C	48
Air inlet temperature to the heating/cooling coil (WB)		min.	°C	14
		max.	°C	26
Extract air temperature		max.	°C	50
Moisture content of extract air [1]		max.	g/kg	15
Supply air temperature		max.	°C	45
Room temperature setpoint		min.	°C	12
		max.	°C	26
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

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.

Table B6: Application limits

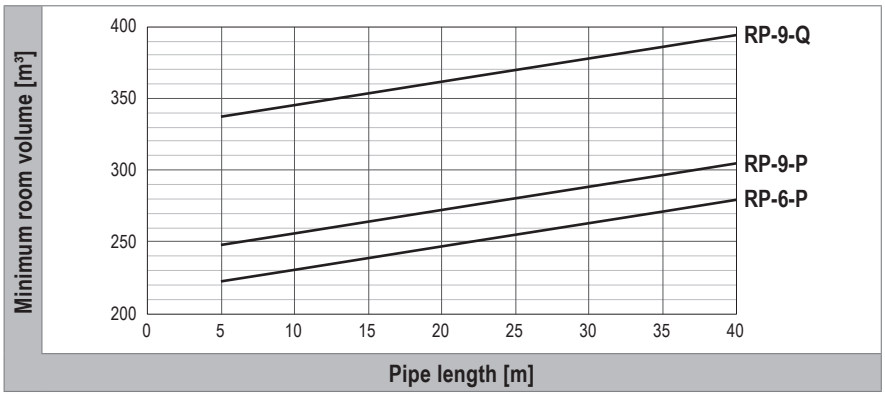


Fig. B3: Minimum room volume depending on the total refrigerant charge in accordance with EN 378

According to EN 378 (Refrigerating systems and heat pumps - Safety and environmental requirements), no additional safety measures for risk reduction are required for Hoval indoor climate units with heat pumps under the following conditions:
- The conditions according to EN 378 Annex C 3.1 are fulfilled.
- The room volume corresponds to the minimum values shown in Fig. B3 meaning that the permissible QLMV value is not exceeded.

3.3 Electrical connection

RoofVent® RP

Unit type		RP-6	RP-9
Supply voltage	V AC	3 × 400	3 × 400
Permitted voltage tolerance	%	± 5	± 5
Frequency	Hz	50	50
Connected load	kW	4.2	8.2
Current consumption max.	A	7.1	13.6
Series fuse	A	13.0	20.0

Table B7: RoofVent® RP electrical connections

Heat pump

Heat pump		P	Q
Supply voltage	V AC	3 × 400	3 × 400
Permitted voltage tolerance	%	± 2	± 2
Frequency	Hz	50	50
Connected load	kW	16.8	2 × 15.9
Current consumption max.	A	26.9	2 × 25.5
Series fuse	A	32.0	2 × 32.0
Inrush current	A	5.9	2 × 5.9

Table B8: Heat pump electrical connections

3.4 Air flow rate

Unit type		RP-6	RP-9
Nominal air flow rate	m³/h	5500	8000
Floor area covered	m²	480	797

Table B9: Air flow rate

3.5 Air filtration

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

Table B10: Air filtration

3.6 Heat recovery system (HRS)

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

Table B11: Thermal transfer level of the plate heat exchanger

3.7 Technical data of the heat pump

Heat pump			P	Q
Heating	Rated heat output [1]	kW	39.2	67.2
	Power consumption	kW	8.43	15.54
	COP	–	4.65	4.32
	$\eta_{s,h}$	–	204	197
	SCOP	–	5.17	4.99
Cooling	Rated cooling capacity [2]	kW	39.2	67.2
	Power consumption	kW	11.88	23.30
	EER	–	3.30	2.88
	$\eta_{s,c}$	–	339	315
	SEER	–	8.55	7.94
Refrigerant		–	R32	R32
Refrigerant fill volume		kg	11.4	2 × 8.5

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: Heat pump technical data

3.8 Heat output

t_F	Type	Q	Q_{TG}	H_{max}	t_S	P_{HP}
°C	RP-	kW	kW	m	°C	kW
-5	6-P	52.4	45.5	10.9	42.5	14.1
	9-P	52.4	43.0	13.6	34.0	14.1
	9-Q	90.0	80.6	10.2	47.9	27.0
-15	6-P	43.2	32.0	12.7	35.3	15.9
	9-P	43.2	27.9	16.7	28.3	15.9
	9-Q	73.8	58.5	11.8	39.7	31.0

Legend:
t_F = Fresh air temperature
Q = Heat output
Q_{TG} = Output to cover fabric heat losses
H_{max} = Maximum mounting height
t_S = Supply air temperature
P_{HP} = Power consumption of the heat pump

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

Table B13: RoofVent® RP heat output

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

3.9 Cooling capacity

t_F	RH_F	Type	Q_{sen}	Q_{tot}	Q_{TG}	t_S	m_C	P_{HP}
°C	%	RP-	kW	kW	kW	°C	kg/h	kW
28	40	6-P	23.9	32.8	18.5	12.0	13.1	7.9
		9-P	26.0	35.7	18.2	15.2	14.2	8.6
		9-Q	39.0	54.2	31.3	10.4	22.2	14.2
	60	6-P	19.6	39.5	14.2	14.3	29.1	10.0
		9-P	21.1	42.5	13.3	17.0	31.4	10.8
		9-Q	32.9	67.3	25.2	12.7	50.5	19.4
32	40	6-P	27.3	42.6	21.9	14.2	22.5	12.0
		9-P	27.3	42.6	19.6	18.7	22.5	12.0
		9-Q	45.9	72.3	38.1	11.8	38.8	23.4
	60	6-P	19.3	45.6	13.9	18.5	38.6	12.7
		9-P	19.3	45.6	11.5	21.7	38.7	12.7
		9-Q	33.2	78.3	25.4	16.6	66.3	25.5

Legend:

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

Reference:

- At fresh air temperature 28 °C: room air 22 °C, extract air 24 °C / 50 % RH
- At fresh air temperature 32 °C: room air 26 °C, extract air 28 °C / 50 % RH

Table B14: RoofVent® RP cooling capacity

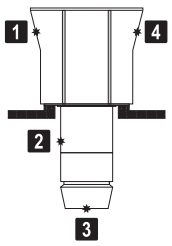
Notice
The output for coverage of transmission sensible gains (Q_{TG}) allows for the ventilation cooling requirement (Q_V) and the output of the energy recovery (Q_{ER}) under the respective air conditions.
The following applies: $Q_{sen} + Q_{ER} = Q_V + Q_{TG}$

3.10 Sound level

RoofVent® RP

Position				1	2	3	4
RP-6	Sound pressure level (at a distance of 5 m) 1)		dB(A)	44	44	52	56
	Total sound power level		dB(A)	66	66	74	78
	Octave sound power level	63 Hz	dB	44	43	45	46
		125 Hz	dB	54	54	59	61
		250 Hz	dB	60	60	65	67
		500 Hz	dB	62	62	68	71
		1000 Hz	dB	57	57	71	74
		2000 Hz	dB	55	55	66	70
		4000 Hz	dB	51	51	61	66
		8000 Hz	dB	50	49	58	64
RP-9	Sound pressure level (at a distance of 5 m) 1)		dB(A)	43	42	52	55
	Total sound power level		dB(A)	65	64	74	77
	Octave sound power level	63 Hz	dB	44	42	45	45
		125 Hz	dB	55	54	61	62
		250 Hz	dB	58	57	64	65
		500 Hz	dB	61	59	68	70
		1000 Hz	dB	58	56	70	73
		2000 Hz	dB	56	55	67	70
		4000 Hz	dB	50	48	59	64
		8000 Hz	dB	44	42	54	59

1) With hemispherical radiation in a low-reflection environment



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

Table B15: RoofVent® RP sound level

Heat pump

Heat pump			P		Q	
			Heating	Cooling	Heating	Cooling
Sound pressure level (at a distance of 5 m)		dB(A)	59.0	59.0	63.0	61.0
Total sound power level [1]		dB(A)	81.0	81.0	85.0	83.0
Octave sound pressure level [2]	63 Hz	dB	62.5	63.6	68.7	67.4
	125 Hz	dB	58.5	58.6	62.4	59.9
	250 Hz	dB	60.1	57.7	62.2	60.8
	500 Hz	dB	58.6	58.4	60.8	59.7
	1000 Hz	dB	54.3	52.2	57.6	56.4
	2000 Hz	dB	51.6	49.8	54.5	53.6
	4000 Hz	dB	53.0	52.8	49.9	50.4
	8000 Hz	dB	46.7	45.9	49.2	48.2

1) The values given are maximum values; the noise level is fluctuating due to scroll technology.
2) Measured at a distance of 1 m in front of the unit and 1 m above the floor in a semi-anechoic chamber.

Table B16: Heat pump sound level

For particularly quiet unit operation (e.g. during the night), the heat pump can be operated in silent mode. It then runs at a reduced speed of the compressor and/or fan, which also leads to a reduced capacity output depending on the setting parameters.

Silent mode	Noise reduction	Capacity level	
		Heat pump P	Heat pump Q
Level 1	− 3 dB	100 %	100 %
Level 2	− 6 dB	95 %	80 %
Level 3	− 9 dB	75 %	55 %

Table B17: Noise reduction and capacity output in silent mode

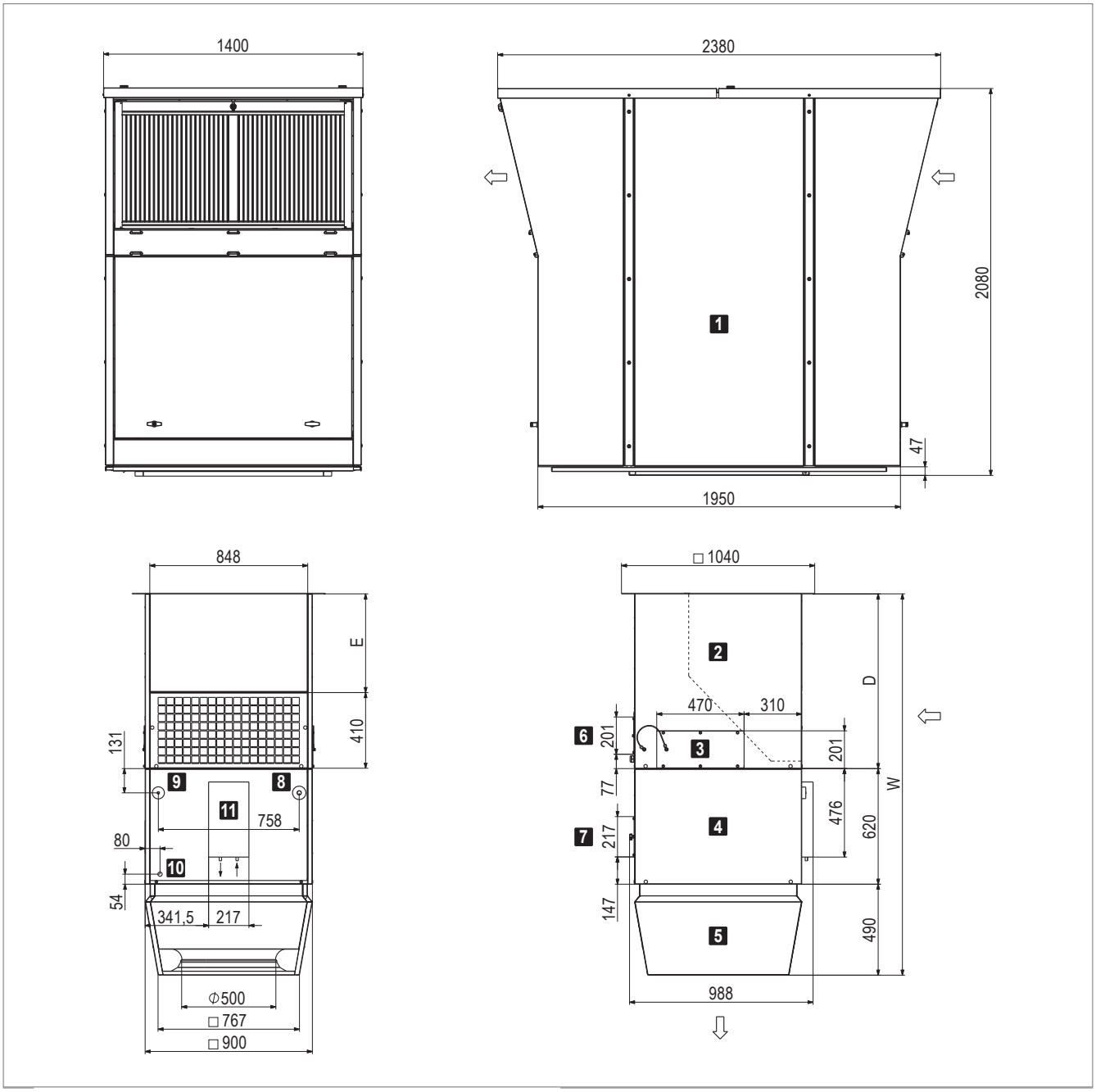
3.11 Product information according to ErP

Trademark / Model		Hoval RoofVent® RP			Unit
		6-P	9-P	9-Q	
Type		NRVU, BVU			–
Drive		Variable speed drive			–
Heat recovery system		other			–
Thermal efficiency of heat recovery (η_{t_nrvu})		77	77	78	%
Nominal flow rate (q_{nom})		1.53	2.22	2.22	m³/s
Effective electric power input (P)		2.27	3.61	3.61	kW
Internal specific fan power (SFP_{int})		920	940	940	W/(m³/s)
Face velocity		2.69	2.98	2.98	m/s
Nominal external pressure ($\Delta p_{s, ext}$)	Supply air	150	270	270	Pa
	Extract air	190	300	300	
Internal pressure drop of ventilation components ($\Delta p_{s, int}$)	Fresh air/supply air	260	288	288	Pa
	Extract air/exhaust air	300	316	316	
Static efficiency of the fans (η_{fan}) in accordance with Regulation (EU) No 327/2011		62	63	63	%
Maximum leakage rate	External	0.45	0.25	0.25	%
	Internal	1.5	1.2	1.2	
Energy classification of the filters (class acc. to ISO 16890, final pressure difference)	Supply air ePM_1 55 %	250	250	250	Pa
	Extract air ePM_{10} 65 %	350	350	350	
Visual filter warning		Displayed on the operating unit			–
Casing sound power level (L_{WA})		73	73	73	dB
Disassembly instructions		Devices that are no longer functional must be dismantled by a specialist company and disposed of at suitable collection points.			–
Contact details		Hoval Aktiengesellschaft Austrasse 70, 9490 Vaduz, Liechtenstein www.hoval.com			

Table B18: Product information according to Commission Regulation (EU) 1253/2014, Article 4(2)

3.12 Dimensions and weights

RoofVent® RP-6-P



1	Roof unit with energy recovery	7	Access panel, condensate separator
2	Connection module	8	Gas line connection (Ø 22 mm)
3	Access panel, coil	9	Liquid line connection (Ø 12 mm)
4	Heating/cooling section	10	Condensate connection (G 1" external)
5	Air-Injector	11	EEV kit P (connection Ø 12.7 mm)
6	Access panel, connection box		

Fig. B4: RoofVent® RP-6-P dimensions

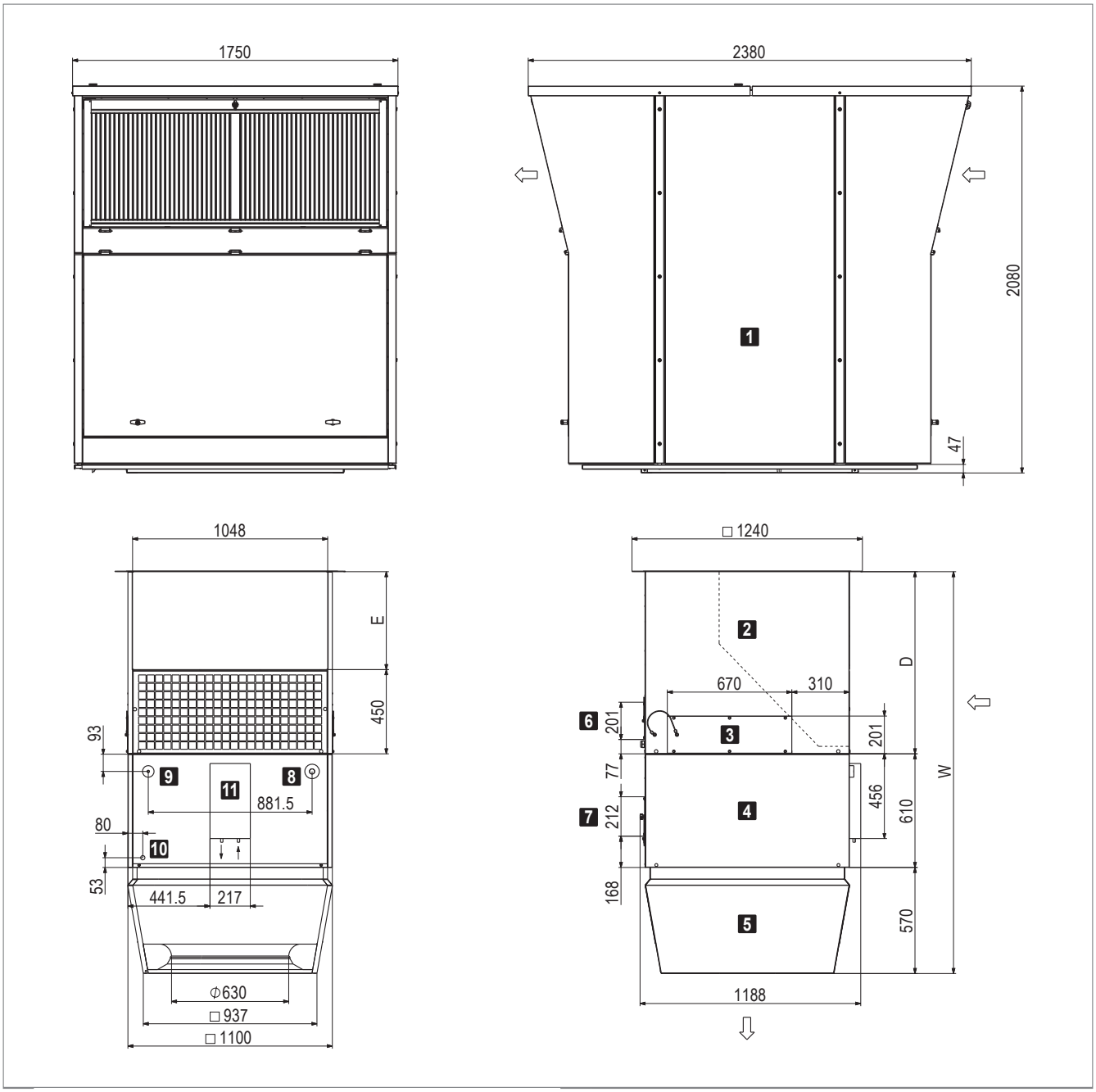
Connection module		V0	V1	V2	V3
D	mm	940	1190	1440	1940
E	mm	530	780	1030	1530
W	mm	2050	2300	2550	3050

Table B19: RoofVent® RP-6-P dimensions

Unit type		RP-6-P
Total	**kg**	**905**
Roof unit	kg	702
Below-roof unit	kg	203
Air-Injector	kg	37
Heating/cooling section	kg	88
Expansion valve	kg	3
Connection module V0	kg	75
Additional weight V1	kg	+ 11
Additional weight V2	kg	+ 22
Additional weight V3	kg	+ 44

Table B20: RoofVent® RP-6-P weights

RoofVent® RP-9-P



1	Roof unit with energy recovery	7	Access panel, condensate separator
2	Connection module	8	Gas line connection (Ø 28 mm)
3	Access panel, coil	9	Liquid line connection (Ø 12 mm)
4	Heating/cooling section	10	Condensate connection (G 1" external)
5	Air-Injector	11	EEV kit P (connection Ø 12.7 mm)
6	Access panel, connection box		

Fig. B5: RoofVent® RP-9-P dimensions

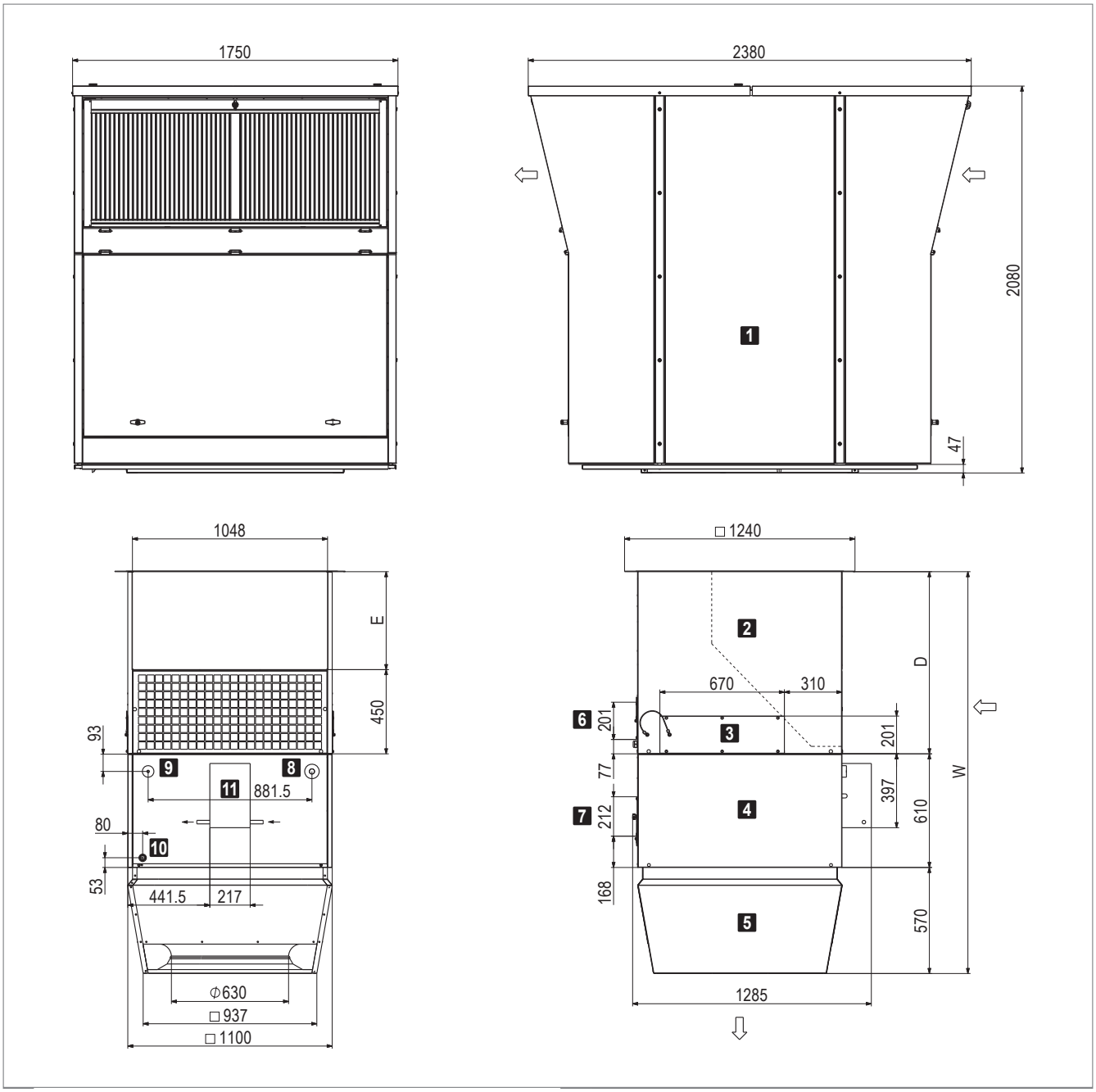
Connection module		V0	V1	V2	V3
D	mm	980	1230	1480	1980
E	mm	530	780	1030	1530
W	mm	2160	2410	2660	3160

Table B21: RoofVent® RP-9-P dimensions

Unit type		RP-9-P
Total	**kg**	**1192**
Roof unit	kg	902
Below-roof unit	kg	290
Air-Injector	kg	56
Heating/cooling section	kg	137
Expansion valve	kg	3
Connection module V0	kg	94
Additional weight V1	kg	+ 13
Additional weight V2	kg	+ 26
Additional weight V3	kg	+ 52

Table B22: RoofVent® RP-9-P weights

RoofVent® RP-9-Q



1	Roof unit with energy recovery	7	Access panel, condensate separator
2	Connection module	8	Gas line connection (Ø 28 mm)
3	Access panel, coil	9	Liquid line connection (Ø 12 mm)
4	Heating/cooling section	10	Condensate connection (G 1" external)
5	Air-Injector	11	EEV-Kit Q (connection Ø 19.05 mm)
6	Access panel, connection box		

Fig. B6: RoofVent® RP-9-Q dimensions

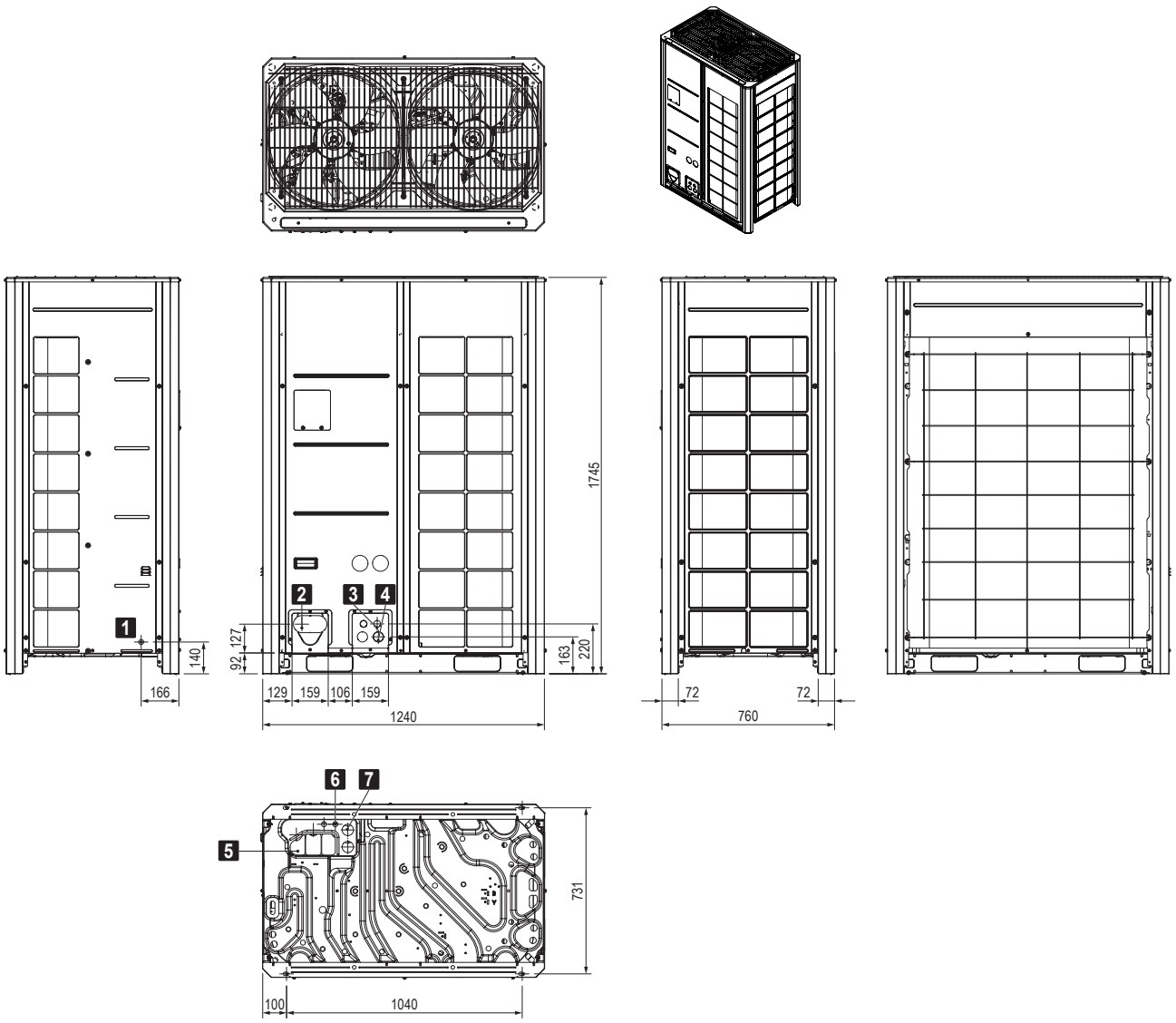
Connection module		V0	V1	V2	V3
D	mm	980	1230	1480	1980
E	mm	530	780	1030	1530
W	mm	2160	2410	2660	3160

Table B23: RoofVent® RP-9-Q dimensions

Unit type		RP-9-Q
Total	**kg**	**1193**
Roof unit	kg	902
Below-roof unit	kg	291
Air-Injector	kg	56
Heating/cooling section	kg	137
Expansion valve	kg	4
Connection module V0	kg	94
Additional weight V1	kg	+ 13
Additional weight V2	kg	+ 26
Additional weight V3	kg	+ 52

Table B24: RoofVent® RP-9-Q weights

Heat pump P



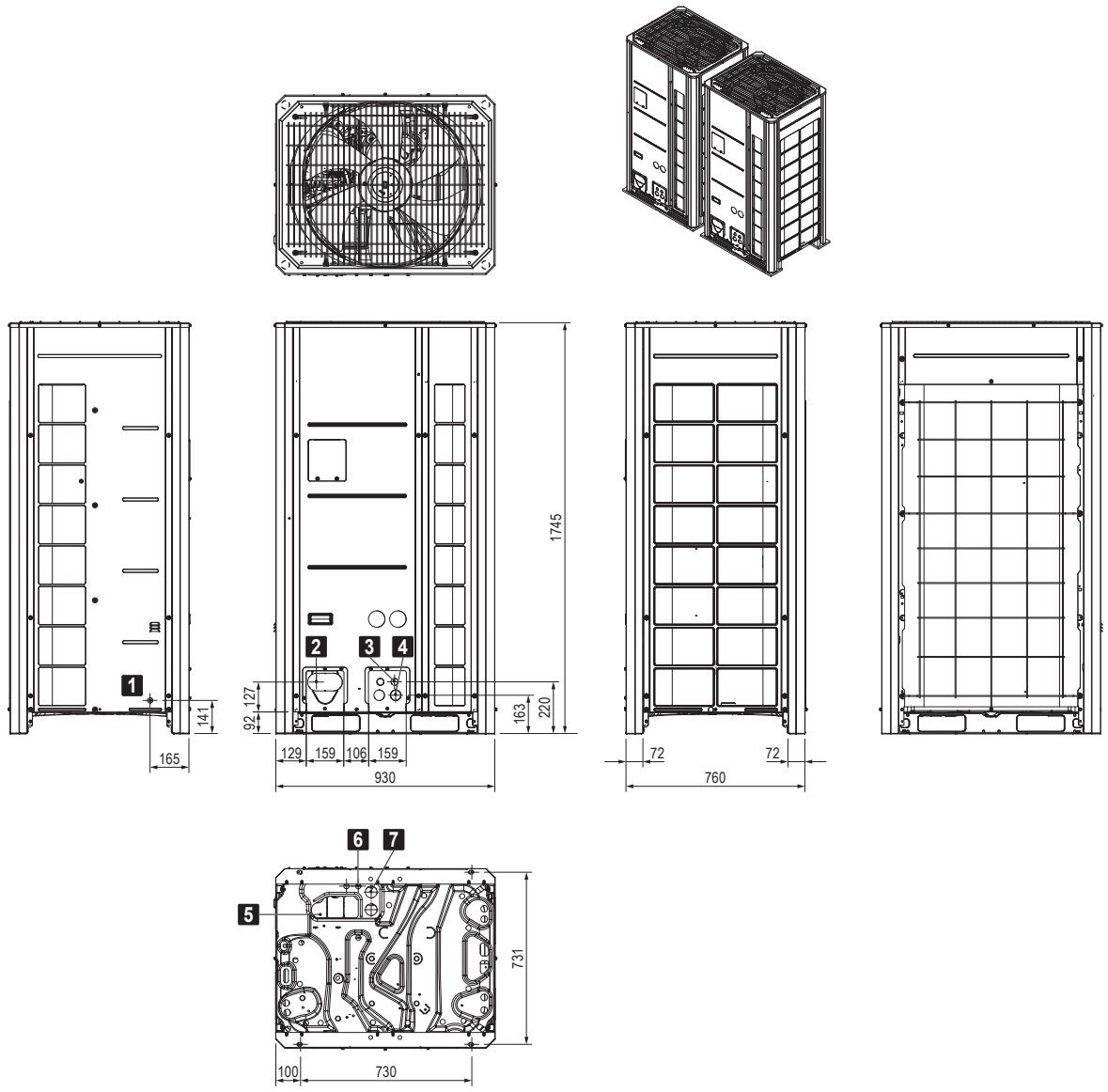
1	Opening for leak-tightness test	
2	Opening for refrigerant pipes (front)	
	■ Liquid line connection	Ø 12.7 mm
	■ Gas line connection	Ø 22.2 mm
3	Opening for signal lines (front)	
4	Opening for mains cable (front)	
5	Opening for refrigerant pipes (bottom)	
6	Opening for signal lines (bottom)	
7	Opening for mains cable (bottom)	

Heat pump		P
Weight	kg	255

Fig. B7: Heat pump P dimensions and weights

B

Heat pump Q



1	Opening for leak-tightness test	
2	Opening for refrigerant pipes (front)	
	■ Liquid line connection	Ø 12.7 mm
	■ Gas line connection	Ø 22.2 mm
3	Opening for signal lines (front)	
4	Opening for mains cable (front)	
5	Opening for refrigerant pipes (bottom)	
6	Opening for signal lines (bottom)	
7	Opening for mains cable (bottom)	

Heat pump		Q
Weight	kg	2 × 215

Fig. B8: Heat pump Q dimensions and weights

4 Specification texts

4.1 RoofVent® RP

Supply and extract air handling unit with reversible heat pump system for ventilation, heating and cooling spaces up to 25 m in height, equipped with highly efficient air distributor.

The unit consists of the following components:
- Roof unit with energy recovery
- Below-roof unit:
  - Connection module
  - Heating/cooling section
  - Air-Injector
- Control components
- Optional components

The heat pump system consists of the following components:
- Heat pump
- Communication kit
- EEV kit
- Branch joint kit (only for heat pump Q)

The RoofVent® RP unit complies with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of ventilation systems. It is a system of the «non-residential ventilation unit» (NRVU) and «bidirectional ventilation unit» (BVU) type, provided for in Commission Regulation (EU) 1253/2014.

Roof unit with energy recovery

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

The roof unit with energy recovery includes:

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

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

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

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

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

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

Control block
Compact design on an easily accessible mounting plate, comprising:
- Unit controller as part of the TopTronic® C control system:
  - Fully wired to the electrical components of the roof unit (fans, actuators, temperature sensors, filter monitoring, differential pressure sensor, conversion board)
  - Pluggable wiring to the control box in the connection module
- High-voltage section:
  - Mains power terminals
  - Isolation switch
  - Button for stopping the fans during filter change
- Low-voltage section:
  - Transformer for actuators, sensors and the unit controller
- Circuit board with further electronic components for unit control (differential pressure measurement, control of heat pump system, fuses for low voltage, ...)

Connection module

Housing made of magnesium-zinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of smooth interior surfaces and ageing-resistant, silicone-free sealing materials; configured with extract air grille and access panel for easy access to the coil for maintenance. The connection module contains:
- Laced wiring harness protected in a sheet metal duct, with direct plug connection to the control block in the roof unit
- Connection box made of magnesium zinc sheet, configured with screw-on cover and cable lead-ins with splash water protection and strain relief; for connection of:
  - Power supply
  - Zone bus
  - Heat pump system
  - All sensors and actuators of the below-roof unit (ready-to-connect)
  - Optional components as required

Connection module V1 / V2 / V3
The connection module is extended for adapting to the local installation situation.

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

Air-Injector

1 Air-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 closed-cell polyethylene foam, 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

2 Air-Injectors
2x Air-Injectors, supplied loose; supply air duct for connecting the RoofVent® unit to the Air-Injectors on site.
Housing made of magnesium zinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with closed-cell polyethylene foam, 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 sensor (supplied in the connection module)

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

Options for the unit

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

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

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

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

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

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

Heat pump system

Highly efficient air-to-air heat pump system in split design with continuously modulating inverter technology for precise capacity control, reversible for heating and cooling the supply air, consisting of the following components:

Heat pump P
- Compact unit for outdoor installation
- Galvanised sheet steel casing, painted in RAL 7038 (agate grey) / RAL 7037 (dusty grey)
- Variable-speed inverter scroll compressor
- 2 speed-controlled fans
- Coated Al/Cu finned-tube evaporator or condenser
- Electronic expansion valve (for heating mode)
- 4-way valve
- Refrigerant shut-off valves
- Refrigerant R32
- Terminal box

Heat pump Q
- Cascade consisting of 2 compact devices for outdoor installation
- Galvanised sheet steel casing, painted in RAL 7038 (agate grey) / RAL 7037 (dusty grey)
- 1 variable-speed inverter scroll compressor per single unit
- 1 speed-controlled fan per single device per single unit
- Coated Al/Cu finned-tube evaporator or condenser
- Electronic expansion valve (for heating mode)
- 4-way valve
- Refrigerant shut-off valves
- Refrigerant R32
- Terminal box

Communication kit PQ
Printed circuit board assembly for communication between heat pump, expansion valve and indoor climate unit and for recording the temperatures at the heating/cooling coil. Mounted and fully wired in the roof unit of the indoor climate unit.

EEV kit P
Galvanised sheet steel casing, with 1 electronic expansion valve for cooling mode, thermally insulated and protected against mechanical damage.
On-site: mounting to the below-roof unit

EEV kit Q
Galvanised sheet steel casing, with 2 electronic expansion valves for cooling mode, thermally insulated and protected against mechanical damage.
On-site: mounting to the below-roof unit

Branch joint kit Q
For connecting the refrigerant lines of the single units in heat pump Q, consisting of 2 copper Y branch joints.

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 units and 10 recirculation 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, supply air 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 recirculation 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
- Activation of the system operator terminal for VNC access, 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
- Control box TW Pro

Power distribution:

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

4.3 TopTronic® C – Single zone control panel

Control system for the energy-optimised operation of decentralised Hoval indoor climate systems. Maximum system size: 1 control zone with up to 10 supply and extract air handling units or supply air units and 10 recirculation units.

System structure

- Zone control panel, designed as compact cabinet for wall installation, made of coated sheet steel (light grey RAL 7035), 380 × 300 × 210 mm, with:
  - System operator terminal
  - Fresh air temperature sensor
  - Zone controller
  - 1 Room temperature sensor (expandable to up to 4 room temperature sensors)
  - Safety relay
  - Electrical cabinet internally pre-wired, all components routed to terminals
- Zone bus: as serial bus for communication with all controllers in the 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
- Circuit board with external connections for:
  - Power supply
  - Zone bus
  - Room temperature sensors (max. 4)
  - Fresh air temperature sensor
  - Combination sensor room air quality, temperature and humidity
  - Collective alarm
  - Forced off
  - Heating demand
  - Setpoint heating demand
  - Fault heat supply
  - Cooling demand
  - Fault cold supply
  - External enabling heating/cooling (for automatic changeover)
  - External setting heating/cooling (for manual changeover)
  - Changeover valves heating/cooling
  - External setpoint fresh air ratio
  - Operating selector switch on terminal (digital)
  - Operating selector button on terminal

Functions, standard

- Room temperature control via sequential control of the coils
- 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 air 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
  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 recirculation 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

- Activation of the system operator terminal for VNC access, for visualisation on customer's PC
- 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

- Additional room temperature sensors (max. 3)
- Combination sensor room air quality, temperature and humidity
- Signal for external extract air fan
- Control box TW Pro

4.4 HovalSupervisor cloud TopTronic® C

(Terms of use according to www.hoval.com/hsc are accepted when ordered.)

HovalSupervisor cloud TopTronic® C
Remote access, visualisation, historization, trends, evaluations and alarming for Hoval indoor climate systems with TopTronic® C control

- Project-specific system engineering
- Visualisation of the system statuses, error messages, actual and nominal values of the entire plant system
- Graphical display of the entire plant control system, in order to complete an analysis of sequences and subsequently to be able to perform an optimisation
- Integrated continuous line recorder for a period of 3 years
- Integrated alarm management
- Multi-user system: simultaneous access, 2 users included per plant
- Max. 300 data points historicized
- Max. 10 control zones

Consisting of:

- Project-specific engineering of the visualisation as described above
- Industrial router for connecting the TopTronic® C control system
  - Metal casing installed in the zone control panel
  - Without SIM card, free choice of phone network
  - Router configuration possible via web server
  - Network connections:
    2 x 10/100Mbit Ethernet
    2 x SIM card slot
  - SMA connections:
    1 x WLAN
    2 x mobile data via integrated antenna
  - Power supply for industrial router installed in zone control panel

HovalSupervisor cloud TopTronic® C subscription
Subscription for use of the HovalSupervisor cloud for visualisation of a TopTronic® C system

- 1 year term (subscription billed once a year)
- Use of the HovalSupervisor cloud and storage of the data in the cloud
- Paid support during business hours (only for the software, not for the system)
- The respective valid conditions of use and the service level agreement (SLA) apply, which can be retrieved online.

Options for HovalSupervisor cloud

- Antenna to improve mobile data reception in conjunction with the HovalSupervisor cloud TopTronic® C
  - Antenna with mounting bracket for on-site installation outside the TopTronic® C zone control panel
  - 2G/3G/4G-LTE/5G-ready
  - SMA port available on the antenna
- Antenna extension cable for connecting the antenna in conjunction with the HovalSupervisor cloud
  - SMA port
  - Double shielded
  - Length: 5 m

Options

1 Type code

RP - 6 - P - RX / ST . -- / V0 . D1 . LU / AF . SI / - . KP . -- . SD / TC . EM . -- . --

Unit type
RoofVent® RP

Unit size
6 or 9

Heating/cooling section
P with coil type P for heat pump P
Q with coil type Q for heat pump Q (only for size 9)

Heat recovery
RX Temperature efficiency ErP 2018

Design
ST Standard

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

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

Paint finish
-- without
LU Paint finish of below-roof unit

Silencers outside
-- without
AF Fresh air and exhaust air silencers

Silencers inside
-- without
SI Supply air and extract air silencers

Condensate pump
-- without
KP Condensate pump

RP - 6 - P - RX / ST . -- / V0 . D1 . LU / AF . SI / - . KP . -- . SD / TC . EM . -- . --

Socket

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

Control system

TC	TopTronic® C

Energy monitoring

--	without
EM	Energy monitoring

Table C1: Type code

2 Connection module

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

3 Design with 2 Air-Injectors

To distribute the supply air over a very wide area, a supply air duct provided by the client can be connected to the RoofVent® unit. 2 Air-Injectors can be installed on this. Please note the following:

- For both unit sizes 2 air distributors size 6 are supplied.
- Install the 2 air distributors on the supply air duct.
- Wire up the 2 actuators of the air distributors to the connection box.
- The supply air temperature sensor is enclosed. Install it in the supply air duct and wire it up to the connection box.

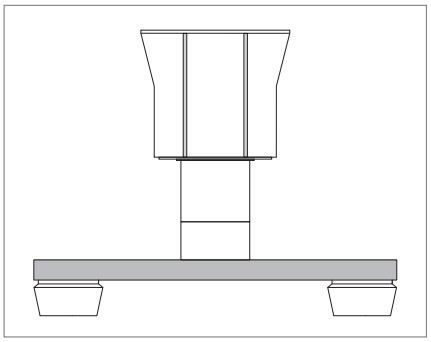
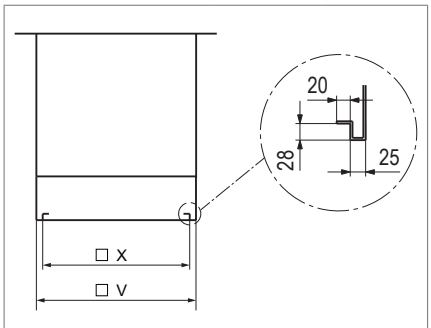


Fig. C1: RoofVent® unit with supply air duct and 2 Air-Injectors



Size		6	9
X	mm	850	1050
V	mm	900	1100

Table C2: Supply air duct connection dimensions (in mm)

4 Design without Air-Injector

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

- The supply air temperature sensor is enclosed. Install it in the supply air duct and wire it up to the connection box.

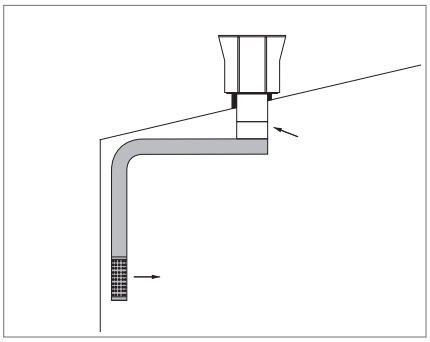


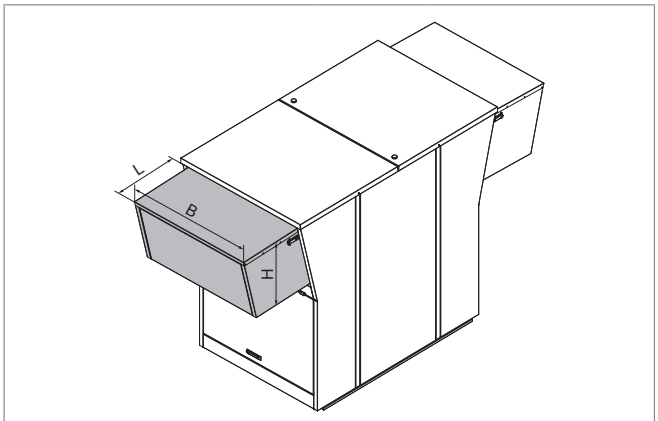
Fig. C2: Connection to an air distribution system supplied by the client (for dimensions see Table C2).

5 Paint finish of below-roof unit

The entire below-roof unit including optional components is painted in any colour.

6 Fresh air and exhaust air silencers

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



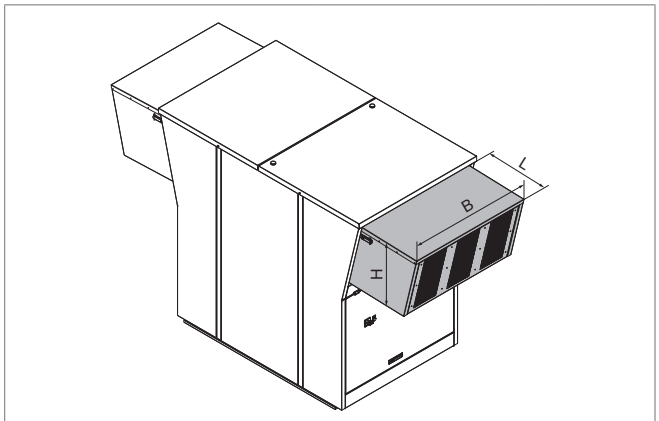
Size		6	9
L	mm	625	625
B	mm	1280	1630
H	mm	650	650
Weight	kg	30	42
Pressure drop	Pa	10	10

Table C3: Technical data fresh air silencer

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

Table C4: Insertion attenuation fresh air silencer (values in dB, relating to the nominal air flow rate)

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



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

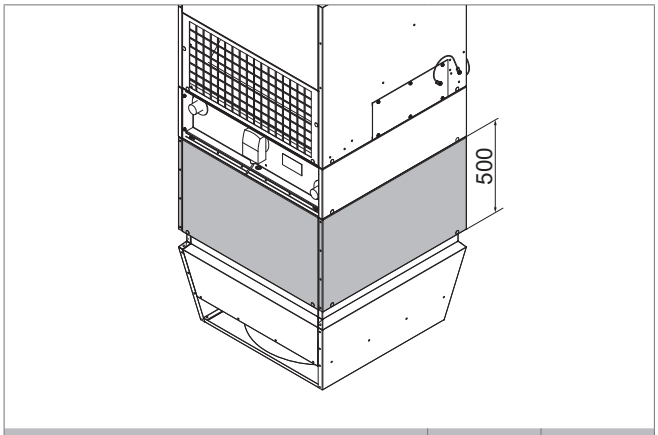
Table C5: Technical data exhaust air silencer

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

Table C6: Insertion attenuation exhaust air silencer (values in dB, relating to the nominal air flow rate)

7 Supply air and extract air silencers

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



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

Table C7: Technical data supply air and extract air silencers

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

Table C8: Insertion attenuation supply and extract air silencers (values in dB, relating to the nominal air flow rate)

8 Condensate pump

RoofVent® cooling units must be connected to a condensate drainage system. For applications in which connection to the waste water system is too expensive or not possible for structural reasons, a condensate pump can be provided. This is installed directly under the condensate drain connection; the supplied container is prepared for installation on the 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 C9: Condensate pump technical data

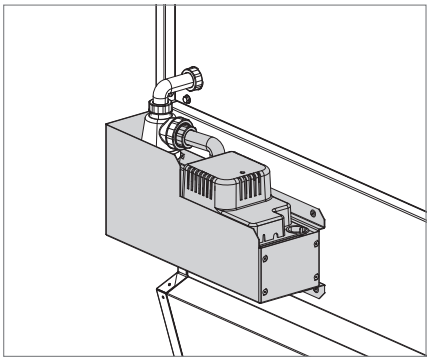


Fig. C3: Condensate pump

9 Socket

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

10 Energy monitoring

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

Transport and installation

1 Installation

1.1 Preparation

The scope of delivery includes:
- RoofVent® unit, delivered in 2 parts on pallets (roof unit, below-roof unit)
- Heat pump
- Accessories (installation material, extract air filter, trap, temperature sensors, EEV kit)
- Optional components

The units are installed in or on the roof. A crane or helicopter is required.

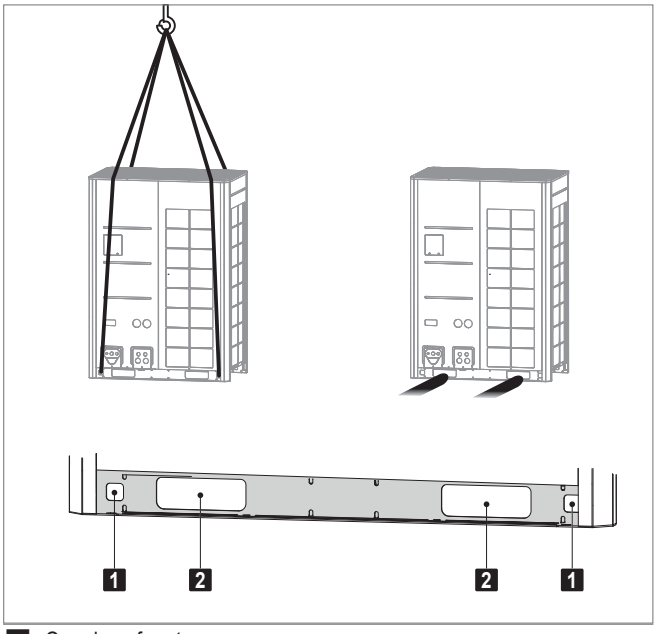
RoofVent® unit
- The units are delivered screwed onto the pallet. To loosen the screws, the inspection doors must be opened. When unloading the units, make sure that there is enough space to open the inspection doors.
- Transport eyes are supplied for lifting the below-roof unit and the roof unit.
  - A ladder will be required to screw in the transport eyes.
  - Use lifting ropes at least 2 m in length to lift the below-roof unit.
  - Use lifting ropes at least 3 m in length to lift the roof unit.
- Depending on the unit size, the below-roof unit can be delivered in 2 parts.
- Make sure that the roof frame corresponds to the specifications in chapter 1.3.
- A sealing compound is required for sealing (e.g. Sikaflex® 221).
- Define the desired orientation of the units (position of the refrigerant connections).

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

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

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

Heat pump
- Lifting the heat pump with a crane:
  - Lift the unit at 4 suspension points.
  - Use 2 straps at least 8 m in length.
  - Pass the straps through the openings at the bottom of the unit.
  - Use cloths or boards to protect the points where the unit comes into contact with the straps.
- Lifting the heat pump 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.



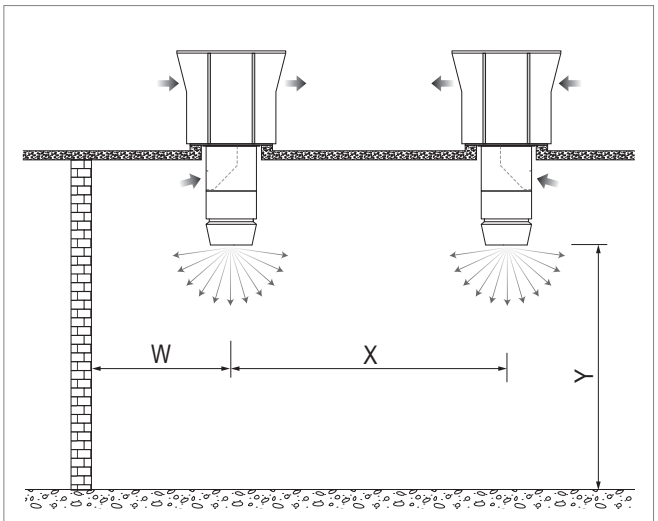
1 Openings for straps
2 Openings for forklift

Fig. D1: Lifting the heat pump

1.2 Positioning

RoofVent® unit

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

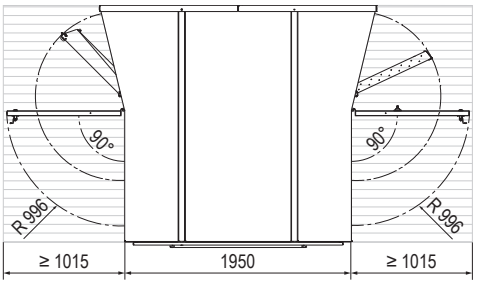


Size			6	9
Distance from wall W	max.	m	11	14
	min.	m	6	7
Unit clearance X	max.	m	22	28
	min.	m	11	13
Mounting height Y	max. 1)	m	Approx. 9…25	
	min.	m	4	5

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

Table D1: Minimum and maximum distances

Roof unit



Roof unit with silencers

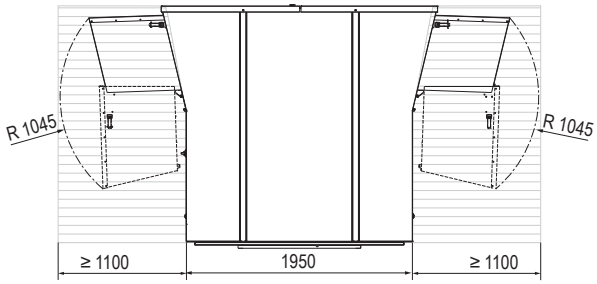


Fig. D2: Space requirements for maintenance on the roof (dimensions in mm)

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

D

Heat pump

- Place the heat pump as close as possible to the indoor climate unit, in a well ventilated location.

> **Notice**
> Excessively long refrigerant lines reduce the efficiency of the system. Place the heat pump as close as possible to the indoor climate unit.

- Note the following when choosing a location:
  - Not near a heat source with high temperature
  - Not in locations where dust or dirt can affect the heat exchangers
  - Not in locations with mineral oil vapours in the air
  - Not in locations with acidic or alkaline vapours in the air
  - Not in locations with a high salt content in the air
- Heat pump Q: Place the two single units as close to each other as possible.
  - The maximum length of the refrigerant pipes between the two single units is 10 m.

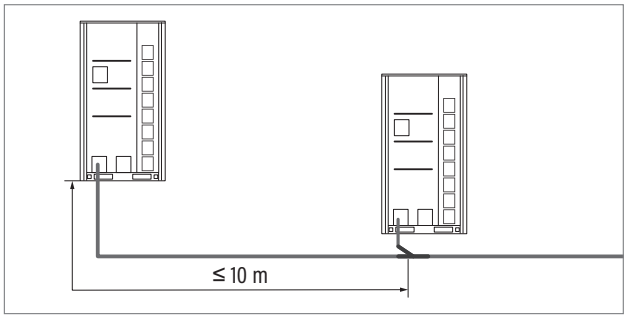


Fig. D3: Maximum length of the refrigerant pipes

- Observe the minimum distances for sufficient air flow through the heat pump.

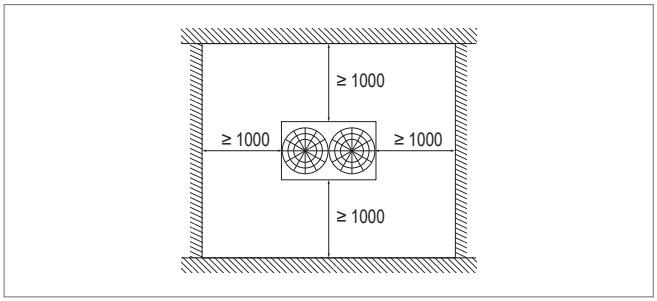


Fig. D4: Minimum distances for the heat pump P (dimensions in mm)

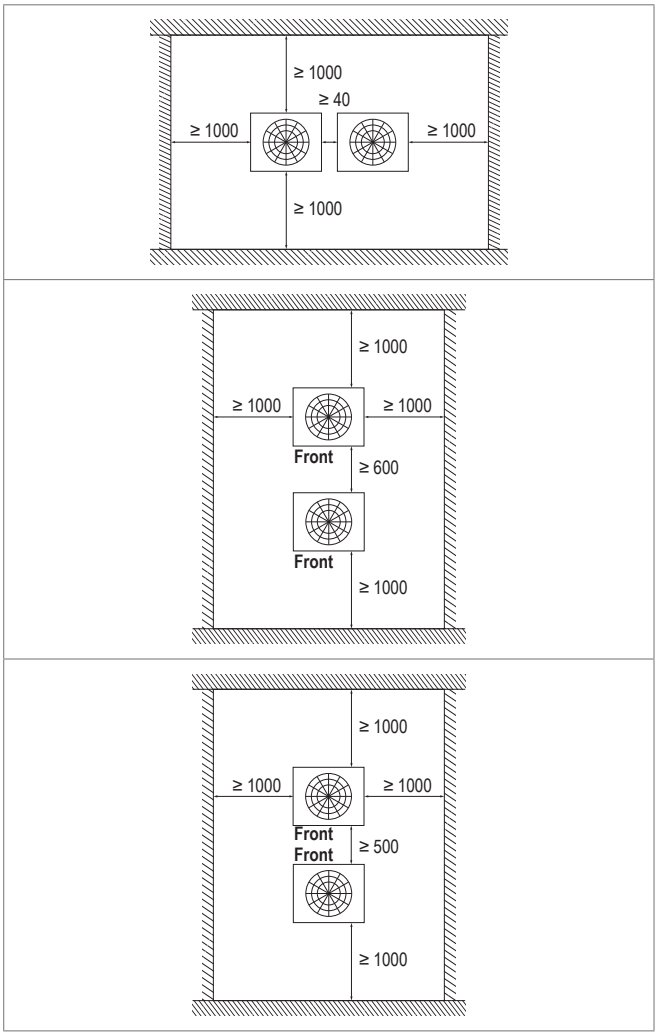


Fig. D5: Minimum distances for the heat pump Q (dimensions in mm)

- Place the heat pump on a solid base with sufficient load-bearing capacity to avoid vibrations and noise.
- Install the heat pump on a solid base or on support blocks made of concrete or steel:
  - The base must be at least 200 mm high to allow sufficient space for the installation of the refrigerant pipes.
  - The support blocks must be at least 100 mm wide and they must also support the unit in the centre.
  - The supporting surface must be flat and level (max. inclination ± 0.2 %). The support points must bear the weight evenly.
  - Water must be free to drain through the base plate of the heat pump.
- Align the heat pump in such a way that the front faces the prevailing wind direction.

- In areas with heavy snowfall:
  - Increase the base height to ensure that the unit operation is not affected by snow.
  - Remove the rear grille from the unit to prevent snow accumulation.

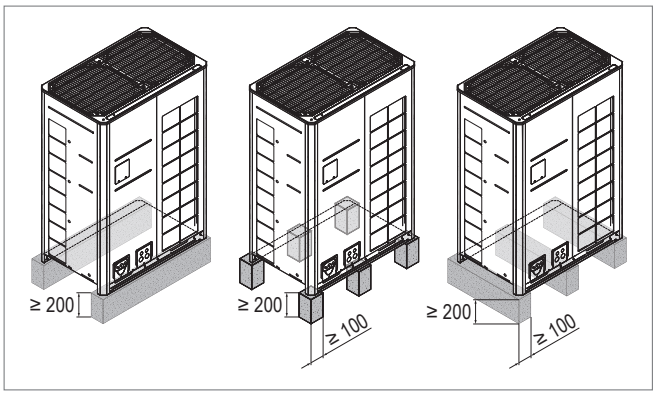
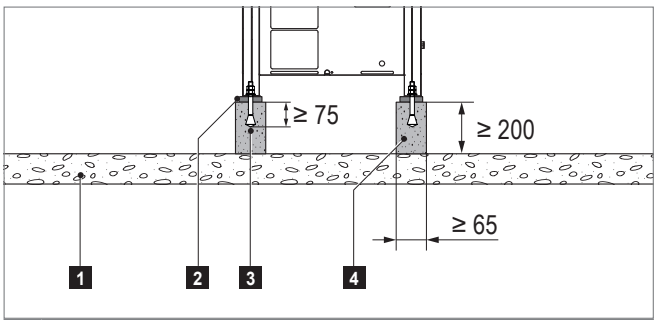
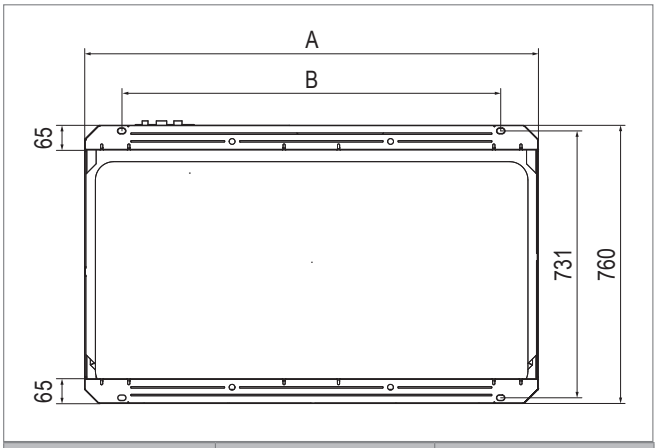


Fig. D6: Base for the heat pump



1	Firm ground
2	Vibration damper
3	Anchor bolt Ø 10 mm
4	Base made of concrete or steel

Fig. D7: Installing the heat pump



Heat pump	P	Q (2 single units)
A	1240	930
B	1040	730

Table D2: Position of the screw connections (dimensions in mm)

D

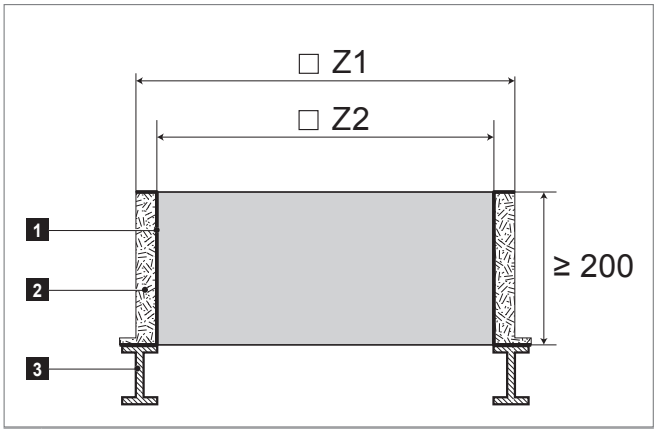
1.3 Roof frame

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

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

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

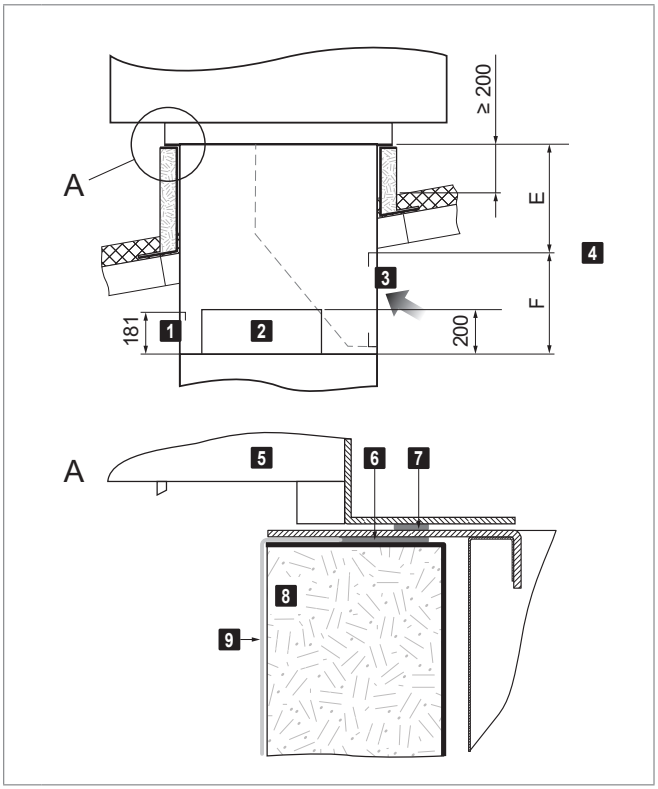
- The opening (dimension Z2) must be large enough to accommodate the below-roof unit.
- The condensate must be able to drain off freely.
- The roof frame must be flat and horizontal.
- Insulate the roof frame before installing the unit (thermal insulation).
- Please observe the minimum distances when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



1 Weight-bearing inner wall of the roof frame
2 Insulation
3 IPE beam

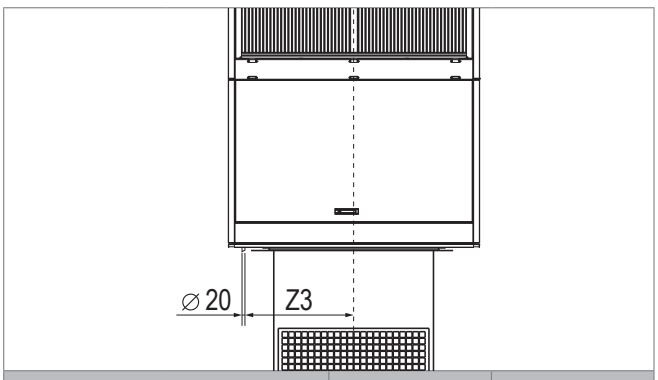
Size			6	9
Z1	max.	mm	1110	1460
Z2	min.	mm	962	1162
	max.	mm	970	1170

Table D3: Dimensions for roof frame



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

Fig. D8: Installation of RoofVent® units in the roof frame (dimensions in mm)



Size		6	9
Z3	mm	571	749

Table D4: Condensate drain of the plate heat exchanger (measured from unit centre)

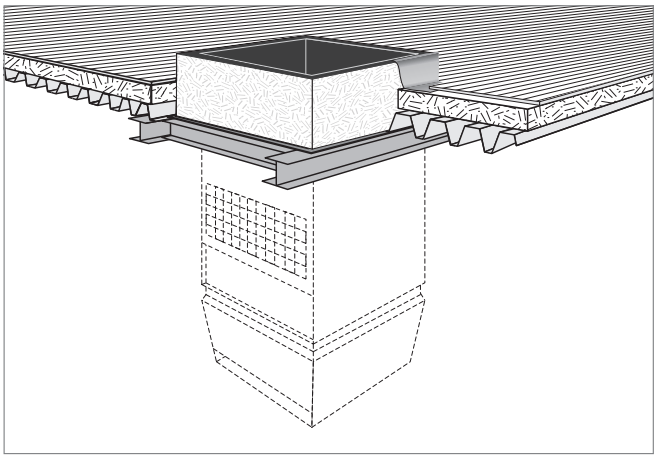


Fig. D9: Conceptual drawing of the roof frame

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

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

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

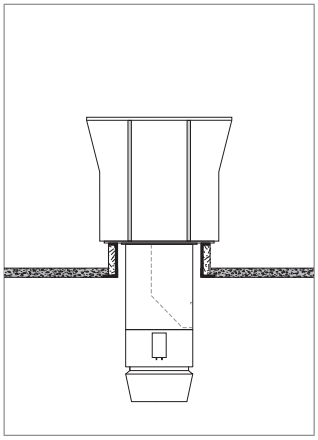


Fig. D10: Roof frame with straight side walls

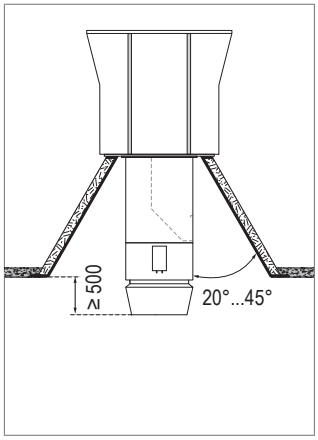


Fig. D11: Roof frame with conical side walls

1.4 Unit installation

Proceed as follows to position the unit:

Below-roof unit

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

Roof unit

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

Heat pump

- Transport the heat pump to the installation site.
- Place the heat pump on the prepared frame.
- Mount the heat pump on the base using vibration dampers and 4 anchor bolts Ø 10 mm.

1.5 Duct connection

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

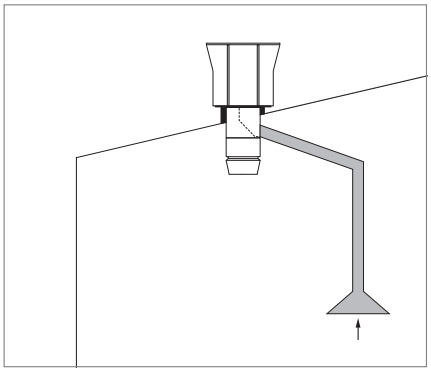
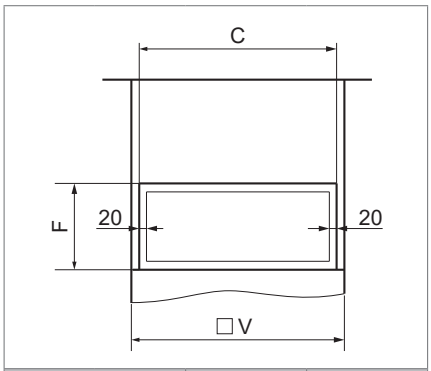


Fig. D12: Extract air duct



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

Table D5: Connection dimensions (in mm)

2 Refrigeration system installation

2.1 Refrigerant pipes

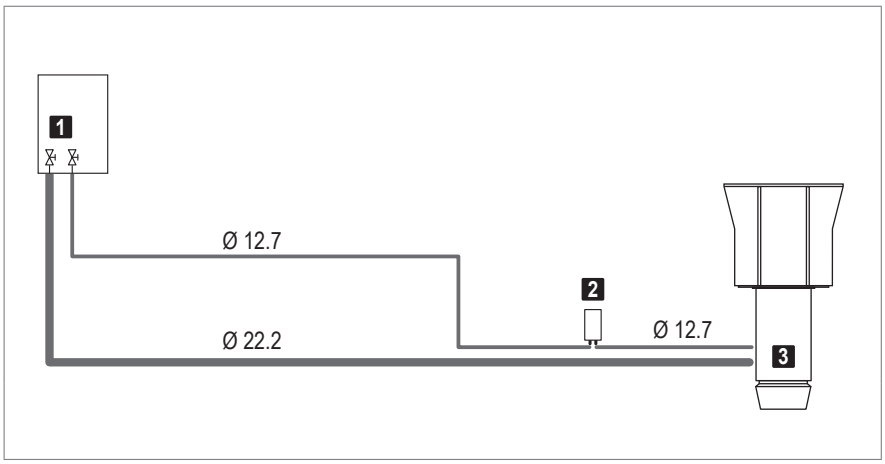
The refrigerant pipes must be installed by a qualified refrigeration technician in line with the local regulations.

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

Notice
Excessively long refrigerant lines reduce the efficiency of the system. Place the heat pump as close as possible to the indoor climate unit.

- Install the refrigerant pipes as shown in Fig. D13 and Fig. D14 schematically according to the local conditions.
- The maximum length of the liquid line is 40 m.
- The maximum height difference between the heat pump and the indoor climate unit is ± 30 m.
- The maximum length between the two single units of heat pump Q is 10 m.

Refrigerant pipes for heat pump P



1 Connections on the heat pump
- Liquid line . . . . . Ø 12.7 mm
- Gas line . . . . . Ø 22.2 mm

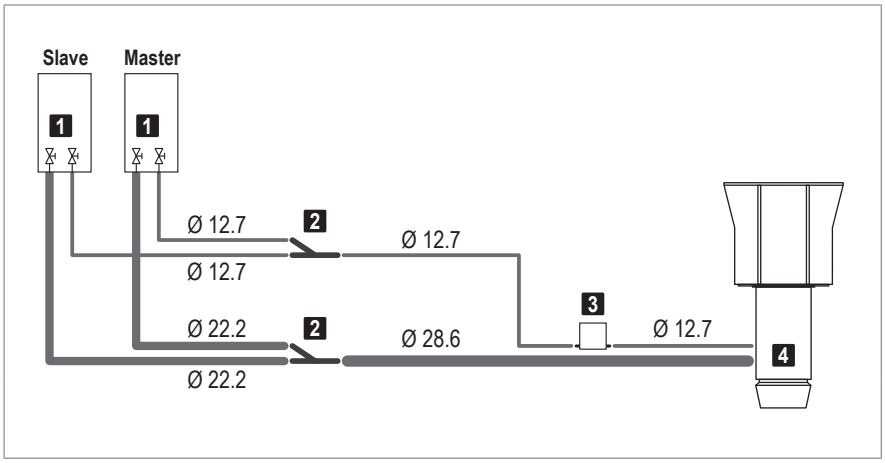
2 EEV kit P, supplied loose, connection Ø 12.7 mm

3 Connections on heating/cooling coil:
Unit size 6:
- Liquid line . . . . . Ø 12 mm
- Gas line . . . . . Ø 22 mm

Unit size 9:
- Liquid line . . . . . Ø 12 mm
- Gas line . . . . . Ø 28 mm

Fig. D13: Refrigerant pipes for heat pump P (pipe diameters in mm)

Refrigerant pipes for heat pump Q



1 Connections on the heat pump
- Liquid line . . . . . Ø 12.7 mm
- Gas line . . . . . Ø 22.2 mm

2 Branch joint kit, supplied loose

3 EEV kit Q, supplied loose, connection Ø 19.05 mm

4 Connections on heating/cooling coil:
- Liquid line . . . . . Ø 12 mm
- Gas line . . . . . Ø 28 mm

Fig. D14: Refrigerant pipes for heat pump Q (pipe diameters in mm)

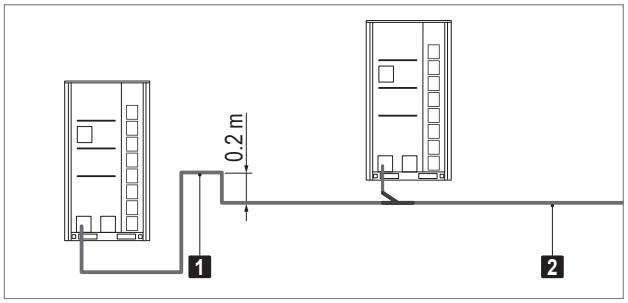
- The thickness of the insulation depends on the pipe diameter. Minimum thicknesses are give in Table D6. Thicker insulation is required in hot, humid environments.

Ø	Minimum thickness [1]	Material
12.7 mm	15 mm	Closed-cell foam, fire protection class B1, temperature-resistant up to 120 °C, outer insulation UV-resistant
22.2 mm	20 mm	
28.6 mm	20 mm	

1) Increase the thickness of the insulation in hot, humid environments (> 80% relative humidity).

Table D6: Insulation of the refrigerant pipes

- If the heat pump is placed lower than the main pipe: Install an oil return trap in the gas line.



1 Oil return trap
2 Main pipe

Fig. D15: Oil return trap

- Install the liquid temperature sensor and the gas temperature sensor as close as possible to the heating/cooling coil.

Heat pump Q

- The heat pump Q consists of 2 single units. Use the branching kit supplied for branching the pipeline.
  - Install the 2 Y branch joints as close as possible to the master unit.
  - The minimum straight pipe length without diameter changes before and after the two Y branch joints is 0.5 m.
  - Install the 2 Y branch joints horizontally so that the two branch pipes are in one plane.

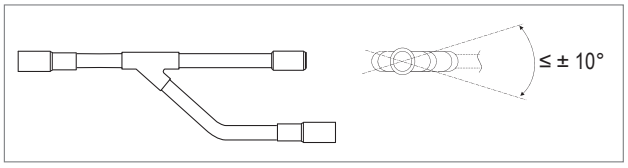
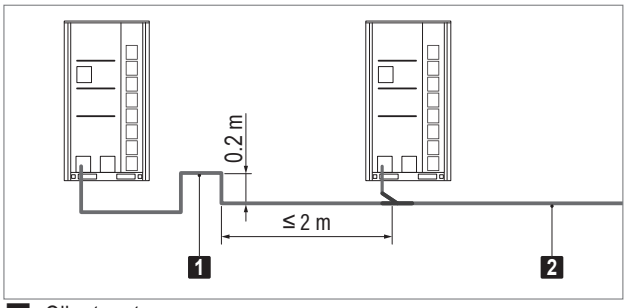


Fig. D16: Installation of the branch joint kit

- If the distance between the 2 single units is more than 2 m: Install an oil return trap in the gas line.



1 Oil return trap
2 Gas line to the indoor climate unit

Fig. D17: Oil return trap

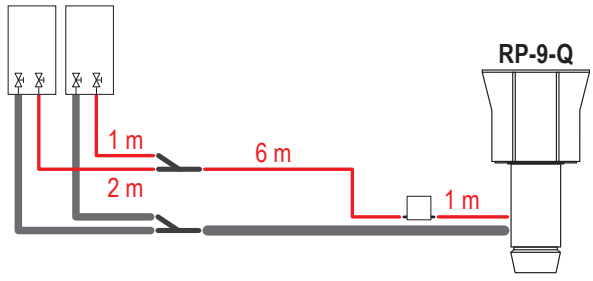
2.2 Calculation of the additional refrigerant fill

The heat pump is filled with R32 refrigerant at the factory. Depending on the length of the liquid line and depending on the size of the unit, refrigerant must also be topped up:

- 0.103 kg refrigerant per metre of liquid line length (from the heat pump to the heating/cooling coil)
- Heating/cooling coil top-up volume:

Unit size		6	9
Refrigerant	kg	2.1	3.7

Table D7: Top-up volume for the heating/cooling coil



(10 m × 0.103 kg/m) + 3.7 kg = **4.73 kg**

Fig. D18: Calculation example

3 Hydraulic installation

3.1 Condensate connection

RoofVent® 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.

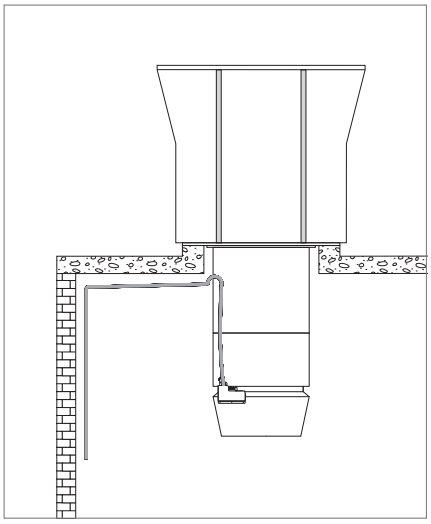


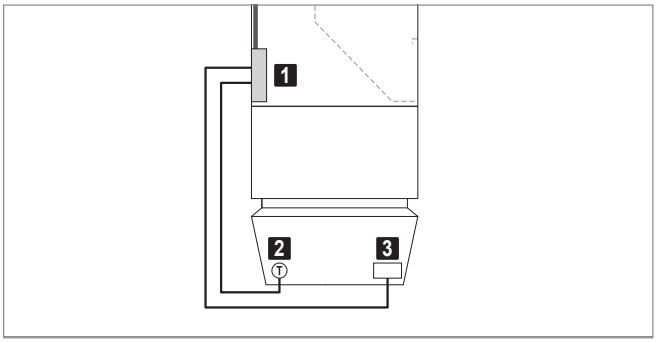
Fig. D19: Condensate line

Heat pump

- Make sure that the heat pump is not damaged by pooling water or ice formation:
  - Make sure that water is free to drain through the bottom plate of the heat pump.

4 Electrical installation

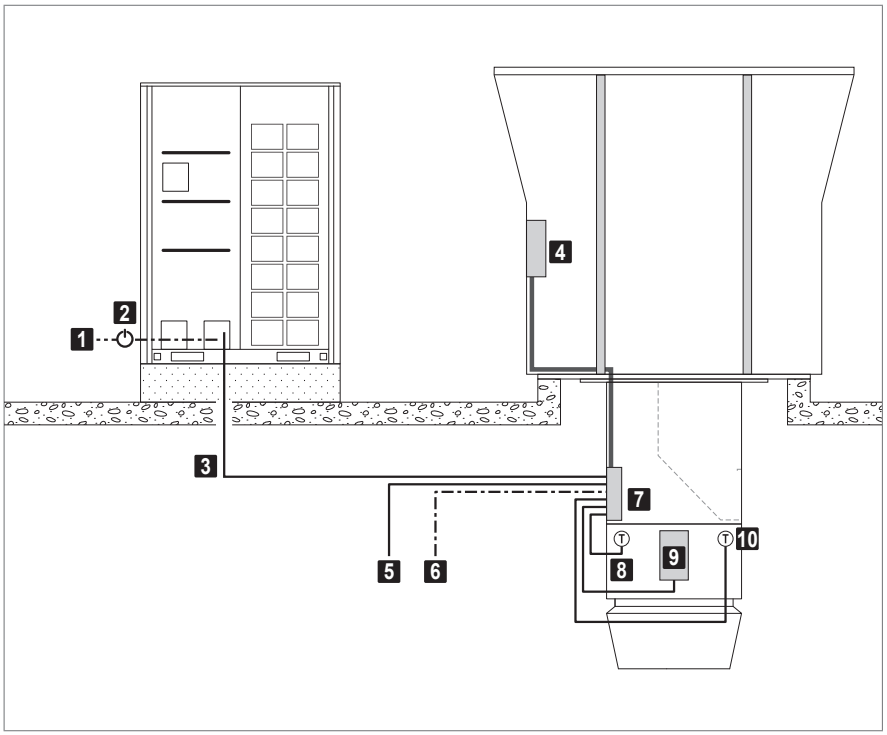
- The electrical installation must only be carried out by a qualified electrician.
- Observe the relevant regulations (e.g. EN 60204-1).
- Choose the dimensions of the cable cross sections in line with the applicable regulations.
- Route signal and bus lines separately from mains cables.
- Make sure 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 RoofVent® RP
  - Power supply for heat pump with main switch in view of the heat pump
  - Zone bus based on system layout
  - Signal lines
- In the RoofVent® RP unit, connect the connection box in the below-roof unit to the control block in the roof unit.
- Connect the electrical components of the below-roof unit to the connection box.
- Connect the electrical components of the heat pump system.
- Connect the optional components to the connection box.



1 Connection box
2 Supply air temperature sensor
3 Actuator Air-Injector

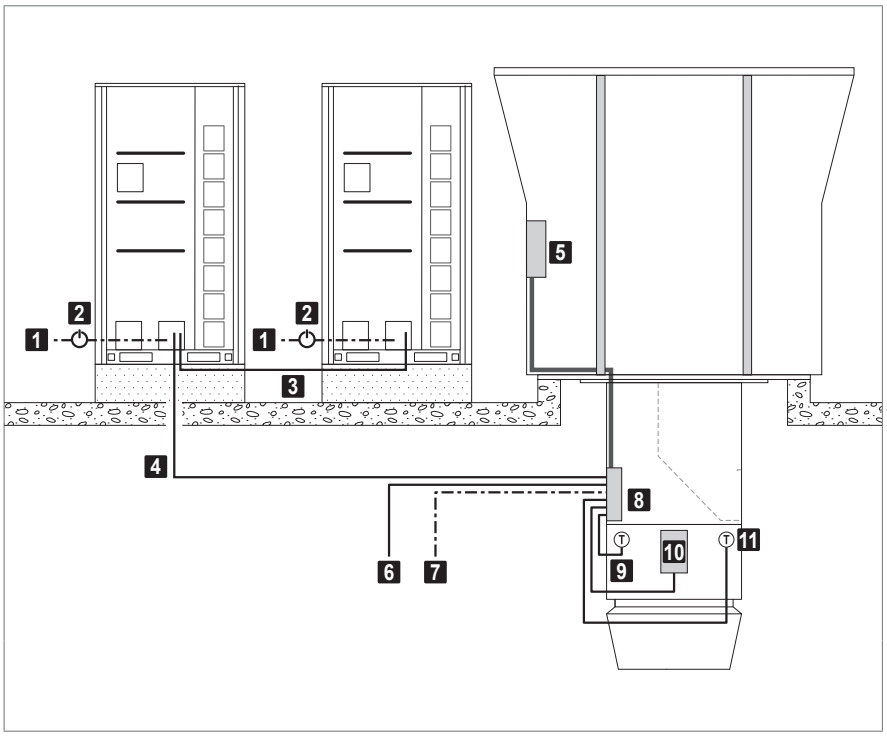
Fig. D20: On-site electrical connection of the Air-Injector and supply air temperature sensor

4.1 Electrical connection of the heat pump system



1	Power supply heat pump
2	Heat pump main switch (on-site)
3	Communication RoofVent®
4	Control block with communication kit
5	Zone bus
6	Power supply RoofVent®
7	Connection box
8	Liquid temperature sensor (supplied loose)
9	EEV kit (supplied loose)
10	Gas temperature sensor (supplied loose)

Fig. D21: Electrical connection of the heat pump system for heat pump P



1	Power supply heat pump
2	Heat pump main switch (on-site)
3	Communication master–slave
4	Communication RoofVent®
5	Control block with communication kit
6	Zone bus
7	Power supply RoofVent®
8	Connection box
9	Liquid temperature sensor (supplied loose)
10	EEV kit (supplied loose)
11	Gas temperature sensor (supplied loose)

Fig. D22: Electrical connection of the heat pump system for heat pump Q

4.2 Cable list for on-site connections – TopTronic® C System control

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	Zone control panel	Hoval units
	System bus		Ethernet ≥ CAT 5	For connecting several zone control panels | max. 100 m	Zone control panel	Further zone control panel
	Integration into the building management system		Ethernet ≥ CAT 5	BACnet, Modbus IP | max. 100 m	Zone control panel	On-site (BMS)
			J-Y(ST)Y 2 × 2 × 0.8 mm	Modbus RTU | max. 1200 m	Zone control panel	On-site (BMS)
	Room temperature sensor		J-Y(ST)Y 2 × 2 × 0.8 mm	max. 100 m	Zone control panel	Sensors
	Additional room temperature sensors		J-Y(ST)Y 2 × 2 × 0.8 mm	max. 100 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. 100 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
	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
	Power supply for units	3 × 400 VAC	NYM-J 5 × 1.5 mm² (min.)	RoofVent® size 6 max. cable cross section 5 × 6 mm²	Zone control panel or on-site	Hoval units
		3 × 400 VAC	NYM-J 5 × 4.0 mm² (min.)	RoofVent® size 9 max. cable cross section 5 × 10 mm²		
		3 × 400 VAC	NYM-J 5 × 1.5 mm² (min.)	TopVent® max. cable cross section 5 × 6 mm²		
	Power supply for heat pump	3 × 400 VAC	NYM-J 5 × 6.0 mm² (min.)	Heat pump P (for 100 m length) max. cable cross section 5 × 16 mm²	Zone control panel or on-site	Hoval heat pump
		3 × 400 VAC	NYM-J 5 × 4.0 mm² (min.)	Heat pump Q – Master (for 100 m length) max. cable cross section 5 × 16 mm²		
		3 × 400 VAC	NYM-J 5 × 4.0 mm² (min.)	Heat pump Q – Slave (for 100 m length) max. cable cross section 5 × 16 mm²		
	System operator terminal (if external)	24 VDC	NYM-J 3 × 1.5 mm²	Power supply 0.42 A | max. 50 m max. cable cross section 3 × 4 mm²	Zone control panel	System operator terminal
			Ethernet ≥ CAT 5	Communication | max. 100 m	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. 500 m	Zone control panel	Zone operator terminal
	External sensor values	0-10 VDC	J-Y(ST)Y 2 × 2 × 0.8 mm	max. 100 m	On-site	Zone control panel
	External set values	0-10 VDC	J-Y(ST)Y 2 × 2 × 0.8 mm	max. 100 m	On-site	Zone control panel
	Load shedding input [1)]	24 VAC	NYM-O 2 × 1.5 mm²	max. 1 A | max. 100 m	On-site	Zone control panel
	Operating selector switch on terminal (analogue)	0-10 VDC	J-Y(ST)Y 2 × 2 × 0.8 mm	max. 100 m	On-site (switch)	Zone control panel
	Operating selector switch on terminal (digital)	0-10 VDC	J-Y(ST)Y 6 × 2 × 0.8 mm	max. 100 m	On-site (switch)	Zone control panel

Component	Designation	Voltage	Cable	Comments	Start	Target
	Operating selector button on terminal	24 VAC	J-Y(ST)Y 6 × 2 × 0.8 mm	max. 0.5 A | max. 100 m	On-site (button)	Zone control panel
	Forced off [1)]	24 VAC	NYM-O 2 × 1.5 mm²	max. 1 A | max. 100 m	On-site	Zone control panel
	Heating/cooling changeover [1)]	24 VAC	NYM-O 2 × 1.5 mm²	Signal external enabling/setting max. 1 A | max. 100 m	On-site	Zone control panel
RoofVent® unit	Power supply	3 × 400 VAC	NYM-J 5 × 1.5 mm² (min.)	RoofVent® size 6 max. cable cross section 5 × 6 mm²	Zone control panel or on-site	RoofVent® unit
		3 × 400 VAC	NYM-J 5 × 4.0 mm² (min.)	RoofVent® size 9 max. cable cross section 5 × 10 mm²		
	Zone bus		J-Y(ST)Y 2 × 2 × 0.8 mm	max. 500 m	Zone control panel	RoofVent® unit
	Forced off	24 VAC	NYM-O 2 × 1.5 mm²	max. 1 A | max. 100 m	On-site	RoofVent® unit
Heat pump	Power supply	3 × 400 VAC	NYM-J 5 × 6.0 mm² (min.)	Heat pump P (for 100 m length) max. cable cross section 5 × 16 mm²	Zone control panel or on-site	Hoval heat pump
		3 × 400 VAC	NYM-J 5 × 4.0 mm² (min.)	Heat pump Q – Master (for 100 m length) max. cable cross section 5 × 16 mm²		
		3 × 400 VAC	NYM-J 5 × 4.0 mm² (min.)	Heat pump Q – Slave (for 100 m length) max. cable cross section 5 × 16 mm²		
	Communication RoofVent®		J-Y(ST)Y 2 × 2 × 0.8 mm		RoofVent® unit	Hoval heat pump
	Communication master–slave		J-Y(ST)Y 1 × 2 × 0.8 mm		Hoval heat pump	Hoval heat pump

1) Use a relay to connect the signal to several zone controllers in parallel.

Table D8: Cable list for on-site connections – TopTronic® C System control

4.3 Cable list for on-site connections – TopTronic® C Single zone control panel

Component	Designation	Voltage	Cable		Comments	Start	Target
TopTronic® C Single zone control panel	Power supply	1 × 230 VAC	NYM-J	3 × 1.5 mm²	max. cable cross section 3 × 6 mm²	On-site	Zone control panel
	Zone bus		J-Y(ST)Y	2 × 2 × 0.8 mm	max. 500 m	Zone control panel	Hoval units
	Integration into the building management system		Ethernet	≥ CAT 5	BACnet, Modbus IP | max. 100 m	Zone control panel	On-site (BMS)
			J-Y(ST)Y	2 × 2 × 0.8 mm	Modbus RTU | max. 1200 m	Zone control panel	On-site (BMS)
	Room temperature sensor		J-Y(ST)Y	2 × 2 × 0.8 mm	max. 100 m	Zone control panel	Sensors
	Additional room temperature sensors		J-Y(ST)Y	2 × 2 × 0.8 mm	max. 100 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. 100 m	Zone control panel	Sensors
	Collective alarm	Volt-free max. 230 VAC	NYM-O	2 × 1.5 mm²	max. 13 A	Zone control panel	On-site
	Operating selector switch on terminal (digital)	0-10 V DC	J-Y(ST)Y	6 × 2 × 0.8 mm	max. 100 m	On-site (switch)	Zone control panel
	Operating selector button on terminal	24 V DC	J-Y(ST)Y	6 × 2 × 0.8 mm	max. 0.5 A | max. 100 m	On-site (button)	Zone control panel
	Forced off	24 V DC	NYM-O	2 × 1.5 mm²	max. 0.5 A | max. 100 m	On-site	Zone control panel
	Heating/cooling changeover	24 V DC	NYM-O	2 × 1.5 mm²	Signal external enabling/setting max. 0.5 A | max. 100 m	On-site	Zone control panel
RoofVent® unit	Power supply	3 × 400 VAC	NYM-J	5 × 1.5 mm² (min.)	RoofVent® size 6 max. cable cross section 5 × 6 mm²	On-site	RoofVent® unit
		3 × 400 VAC	NYM-J	5 × 4.0 mm² (min.)	RoofVent® size 9 max. cable cross section 5 × 10 mm²		
	Zone bus		J-Y(ST)Y	2 × 2 × 0.8 mm	max. 500 m	Zone control panel	RoofVent® unit
	Forced off	24 VAC	NYM-O	2 × 1.5 mm²	max. 1 A | max. 100 m	On-site	RoofVent® unit
Heat pump	Power supply	3 × 400 VAC	NYM-J	5 × 6.0 mm² (min.)	Heat pump P (for 100 m length) max. cable cross section 5 × 16 mm²	On-site	Hoval heat pump
		3 × 400 VAC	NYM-J	5 × 4.0 mm² (min.)	Heat pump Q – Master (for 100 m length) max. cable cross section 5 × 16 mm²		
		3 × 400 VAC	NYM-J	5 × 4.0 mm² (min.)	Heat pump Q – Slave (for 100 m length) max. cable cross section 5 × 16 mm²		
	Communication RoofVent®		J-Y(ST)Y	2 × 2 × 0.8 mm		RoofVent® unit	Hoval heat pump
	Communication master–slave		J-Y(ST)Y	1 × 2 × 0.8 mm		Hoval heat pump	Hoval heat pump

Table D9: Cable list for on-site connections – TopTronic® C Single zone control panel

System design

1 Design example

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

Design data		Example
■ Hall geometry (L × W × H) ■ Required fresh air flow rate ■ Internal heat gains (machines, lighting, etc.) ■ Heating and cooling with decentralised heat pump		52 × 42 × 9 m 32000 m³/h 23 kW → Unit type RP
Design conditions heating:	■ Fresh air temperature ■ Room temperature ■ Extract air conditions ■ Fabric heat losses	- 8 °C 20 °C 22 °C / 40 %rh 93 kW
Design conditions cooling:	■ Fresh air temperature ■ Room temperature ■ Extract air temperature ■ Transmission sensible gains	32 °C / 40 %rh 26 °C 28 °C 47 kW
Number of units ■ Calculate the required number of units: n = Fresh air flow rate / nominal air flow rate		n = 32000 / 8000 = 4 → 4 units size 9
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. – To ensure that the plate heat exchanger cannot freeze, calculate the output data in the «with icing protection» mode.		(93 – 23) / 4 = 17.5 kW per unit RP-9-P: 22.0 kW RP-9-Q: 59.8 kW → Heating/cooling coil type P
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.		(47 + 23) / 4 = 17.5 kW per unit RP-9-P: 19.6 kW RP-9-Q: 38.1 kW → Heating/cooling coil type P

Checks	
■ Effective air flow rate V_{eff} = Nominal air flow rate × n	8000 × 4 = 32000 m³/h 32000 m³/h ≥ 32000 m³/h → OK
■ Effective heat output $Q_{H\_effective}$ = Output for coverage of fabric heat losses × n	22.0 × 4 = 88.0 kW 88.0 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 – length of below-roof unit	9000 – 2050 = 6950 mm Y_{min} = 5.0 m < 6.95 m → OK Y_{max} = 13.7 m > 6.95 m → OK
■ Effective cooling capacity $Q_{c\_effective}$ = Output for coverage of transmission sensible gains × n	19.6 × 4 = 78.4 kW 78.4 kW > (47 + 23) kW → OK
■ Floor area covered Compare the floor area covered with the base area of the hall (L × W). A = Floor area covered × n	797 × 4 = 3188 m² 52 × 42 = 2184 m² 3188 m² > 2184 m² → OK
■ Minimum and maximum clearances Determine the positioning of the units according to the number of units and the base area of the hall; check the minimum and maximum clearances.	n = 4 = 2 × 2 Unit clearance in length: X = 52 / 2 = 26 m X_{max} = 28 ≥ 26 m X_{min} = 13 ≤ 26 m → OK Unit clearance in width: X = 42 / 2 = 21 m X_{max} = 28 ≥ 21 m X_{min} = 13 ≤ 21 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 RoofVent® unit and the heat pump	Annually by Hoval customer service

Table E1: Maintenance schedule

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

Information about the hall

Application		Length	
Type		Width	
Insulation		Height	

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

Design data

Fresh air flow rate		m^3/h
Fresh air / hall area		m^3/h per m^2
Air change rate		
Internal heat gains (machines, ...)		kW
Heating and cooling		
Unit size		
Control zones		

Design conditions heating

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

Design conditions cooling

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

Further information

Hoval quality.
You can count on us.

Hoval

Hoval is one of the leading international companies for heating and indoor climate solutions. Drawing on more than 75 years of experience and benefiting from a close-knit team culture, the Hoval Group delivers exciting solutions and develops technically superior products. This leadership role requires a sense of responsibility for energy and the environment, which is expressed in an intelligent combination of different heating technologies and customised indoor climate solutions.

Hoval also provides personal consultations and comprehensive customer service. With around 2500 employees in 15 companies around the world, Hoval sees itself not as a conglomerate, but as a large family that thinks and acts globally.
Hoval heating and indoor climate solutions are currently exported to more than 50 countries.

Responsibility for energy and environment

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