Hoval

Indoor Climate Systems

Hoval TopVent®
CP | SP

Operating instructions

Original operating manual
4 222 040-en-02

Hoval | Responsibility for energy and environment

1 Use

1.1 Intended use

TopVent® CP recirculation unit

TopVent® CP units are recirculation units intended for heating and cooling spaces up to 25 m in height with decentralised heat pump. They have the following functions:

- Heating and cooling with heat pump
- Recirculation operation
- Air distribution and destratification with adjustable Air-Injector
- Air filtration (option)

The TopVent® CP unit complies with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of ventilation systems. It is a system of the 'fan coil unit' type, provided for in Commission Regulation (EU) 2016/2281.

TopVent® SP supply air unit

TopVent® SP units are supply air units intended for ventilation, heating and cooling spaces up to 25 m in height with decentralised heat pump. They have the following functions:

- Heating and cooling with heat pump
- Fresh air supply
- Mixed air operation
- Recirculation operation
- Air distribution and destratification with adjustable Air-Injector
- Air filtration

The TopVent® SP 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 'unidirectional ventilation unit' (UVU) type, provided for in Commission Regulation (EU) 1253/2014.

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

1.2 User group

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

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

2 Safety

2.1 Symbols

Caution
This symbol warns against risk of injury. Please heed all instructions designated by this symbol to prevent injuries and/or death.

Attention
This symbol warns against property damage. Please heed the respective instructions to prevent risk of damage to the unit and its functions.

Notice
This symbol denotes information about the economic use of the equipment or special tips.

2.2 Operational safety

TopVent® units are state-of-the-art and safe to operate. All control and safety valves are checked at the factory. Nevertheless, hazards may emanate from the units if they are used incorrectly or not used as intended. Therefore:

- The unit may only be installed, operated and serviced by authorised, trained and instructed skilled personnel:
  - Specialists as defined by these operating instructions are those persons who, based on their training, knowledge and experience as well as their knowledge of the relevant regulations and guidelines, can carry out the work assigned to them and recognise potential hazards.
- Please read the operating instructions before unpacking, installing, commissioning and before maintaining the equipment.
- Store the operating instructions so that they are easily accessible.
- Observe any attached information and warning signs.
- Immediately replace damaged or removed informational and warning signs.
- Follow the local safety and accident prevention regulations at all times.
- Observe the particular dangers involved in working on the roof and on electrical systems.
- When working on the unit, objects (e.g. tools) could be dropped. Block off the area underneath the unit.
- Do not attach additional loads to the unit.
- When working in the unit, take precautions against unprotected, sharp metal edges.
- Wear suitable protective equipment (helmet, gloves, mouth protection, goggles).
- Following maintenance work, professionally reassemble all dismantled protective devices.
- Ensure that all access doors are properly closed to prevent water entry through the roof unit.
- Replacement parts must comply with the technical requirements of the system manufacturer. Hoval recommends the use of original spare parts.
- Unauthorised reconfiguration or modification of the unit is not permitted.
- Shut down the unit immediately, if any defects are ascertained that limit the operational safety.

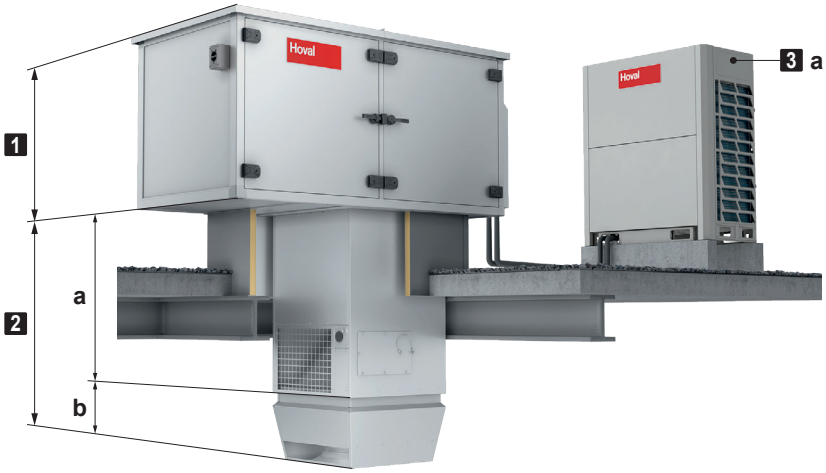
2.3 Decommissioning

Disconnect the power supply with the main switch in the control panel.

Caution
The use of condensers can pose a danger of fatal injury from directly touching live parts even after the unit is switched off. Only open the access doors after waiting 3 minutes.

3 Construction and operation

3.1 Components

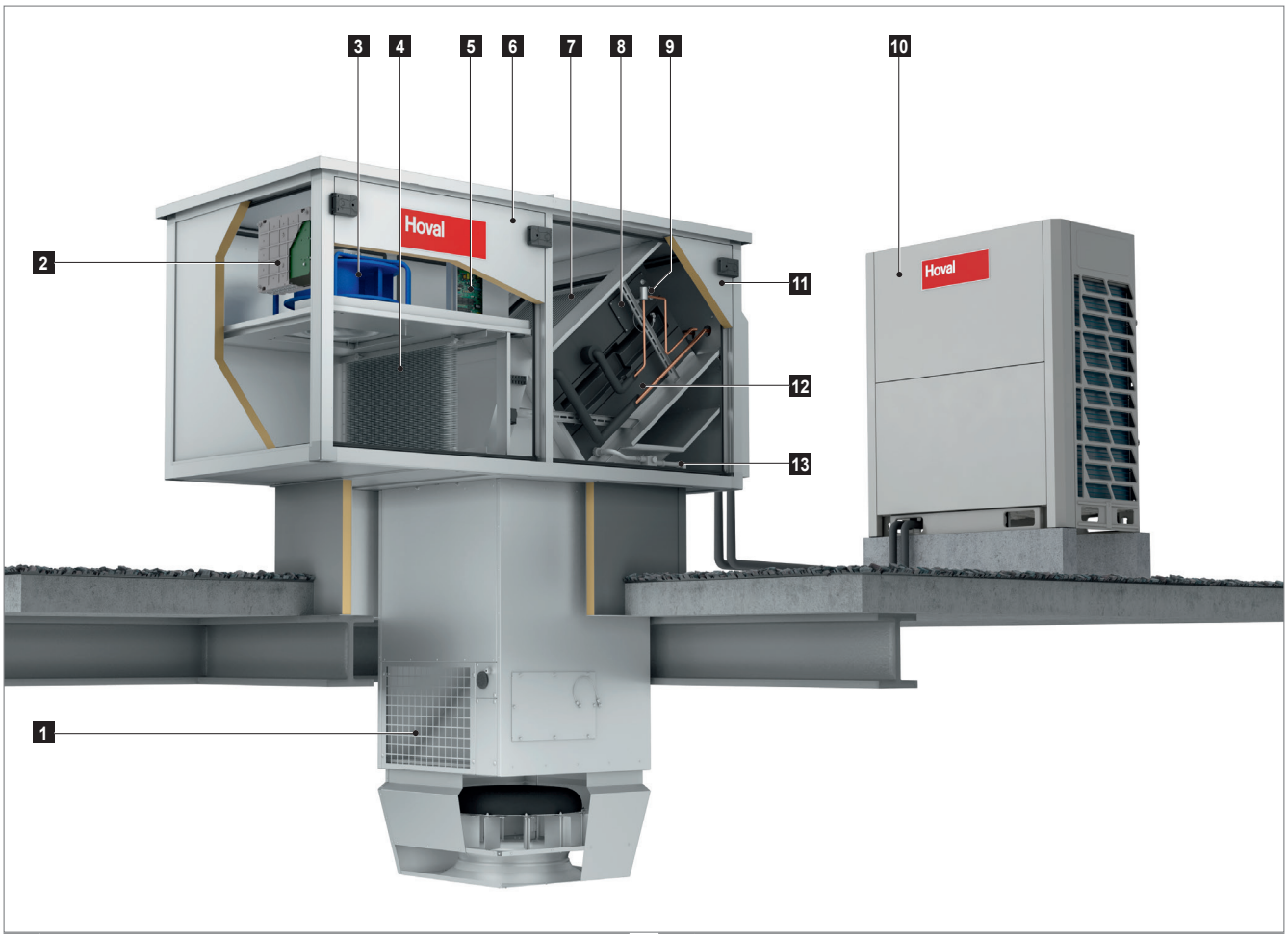


1 Roof unit
2 Below-roof unit
- **a** Connection module
- **b** Air-Injector

3 Heat pump system
- **a** Heat pump Belaria® VRF
- **b** Conversion board (mounted in the roof unit)
- **c** Expansion valve (supplied loose)

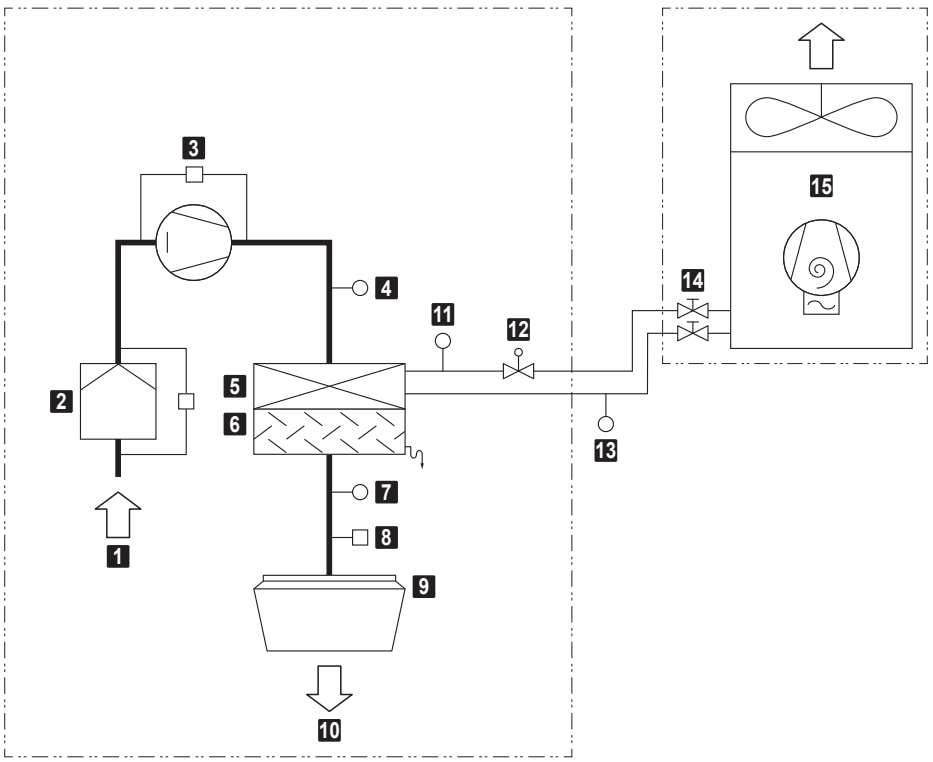
Fig. 1: Components

3.2 Construction and operation TopVent® CP-6



1	Extract air grille	8	Access panel, liquid temperature sensor
2	Unit control box	9	Expansion valve (supplied loose)
3	Fan	10	Heat pump Belaria® VRF (33, 40)
4	Extract air filter	11	Refrigerant connection access door
5	Conversion board	12	Condensate separator
6	Fan access door	13	Condensate drain
7	Heating/cooling coil		

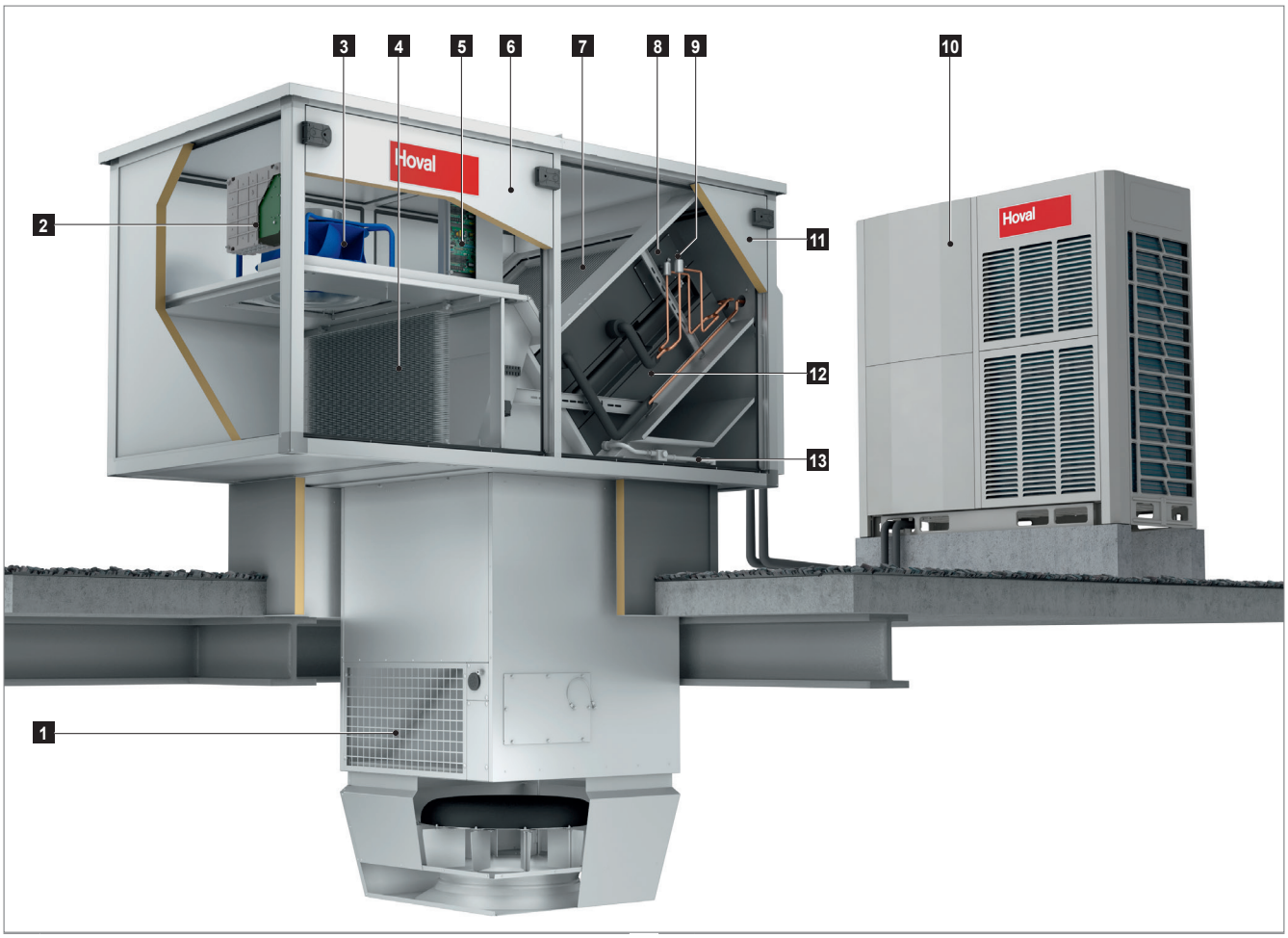
Fig. 2: Construction TopVent® CP-6



1	Extract air	9	Air-Injector
2	Extract air filter with differential pressure switch	10	Supply air
3	Fan with flow rate monitoring	11	Liquid temperature sensor
4	Air inlet temperature sensor heating/cooling coil	12	Expansion valve (supplied loose)
5	Heating/cooling coil	13	Gas temperature sensor (supplied loose)
6	Condensate separator	14	Shut-off valves
7	Supply air temperature sensor	15	Heat pump Belaria® VRF (33, 40)
8	Actuator Air-Injector		

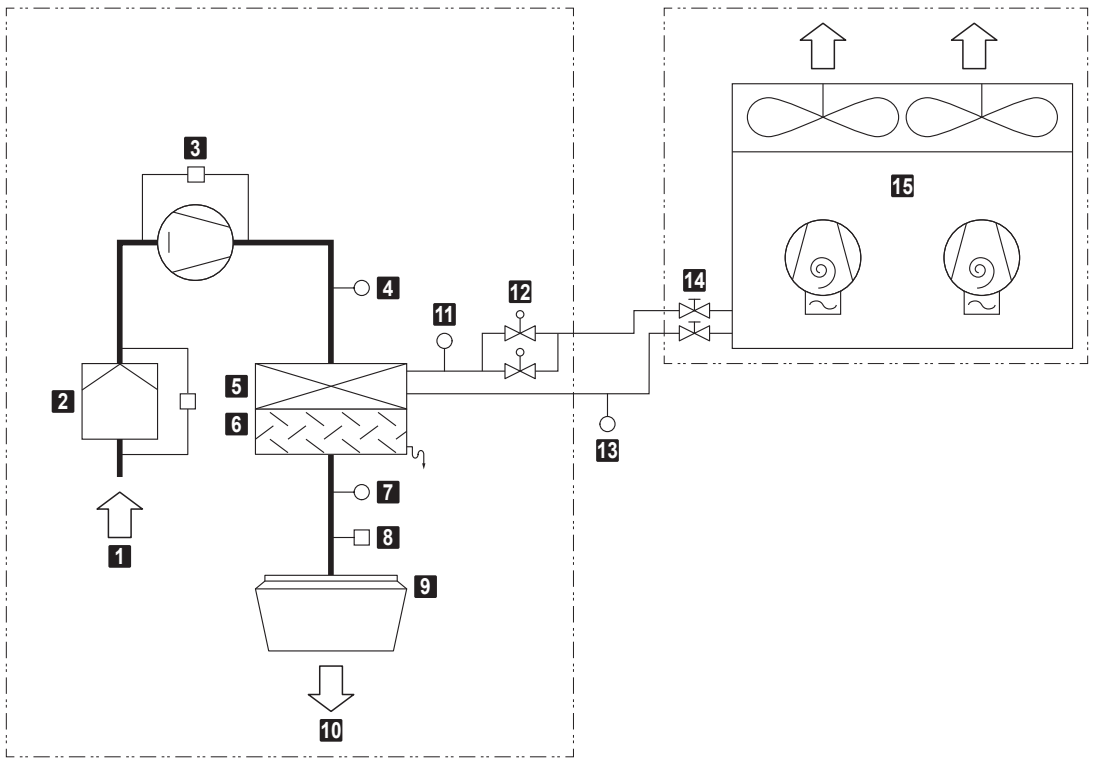
Table 1: Function diagram TopVent® CP-6

3.3 Construction and operation TopVent® CP-9



1	Extract air grille	8	Access panel, liquid temperature sensor
2	Unit control box	9	Expansion valves (supplied loose)
3	Fan	10	Heat pump Belaria® VRF (67)
4	Extract air filter	11	Refrigerant connection access door
5	Conversion boards	12	Condensate separator
6	Fan access door	13	Condensate drain
7	Heating/cooling coil		

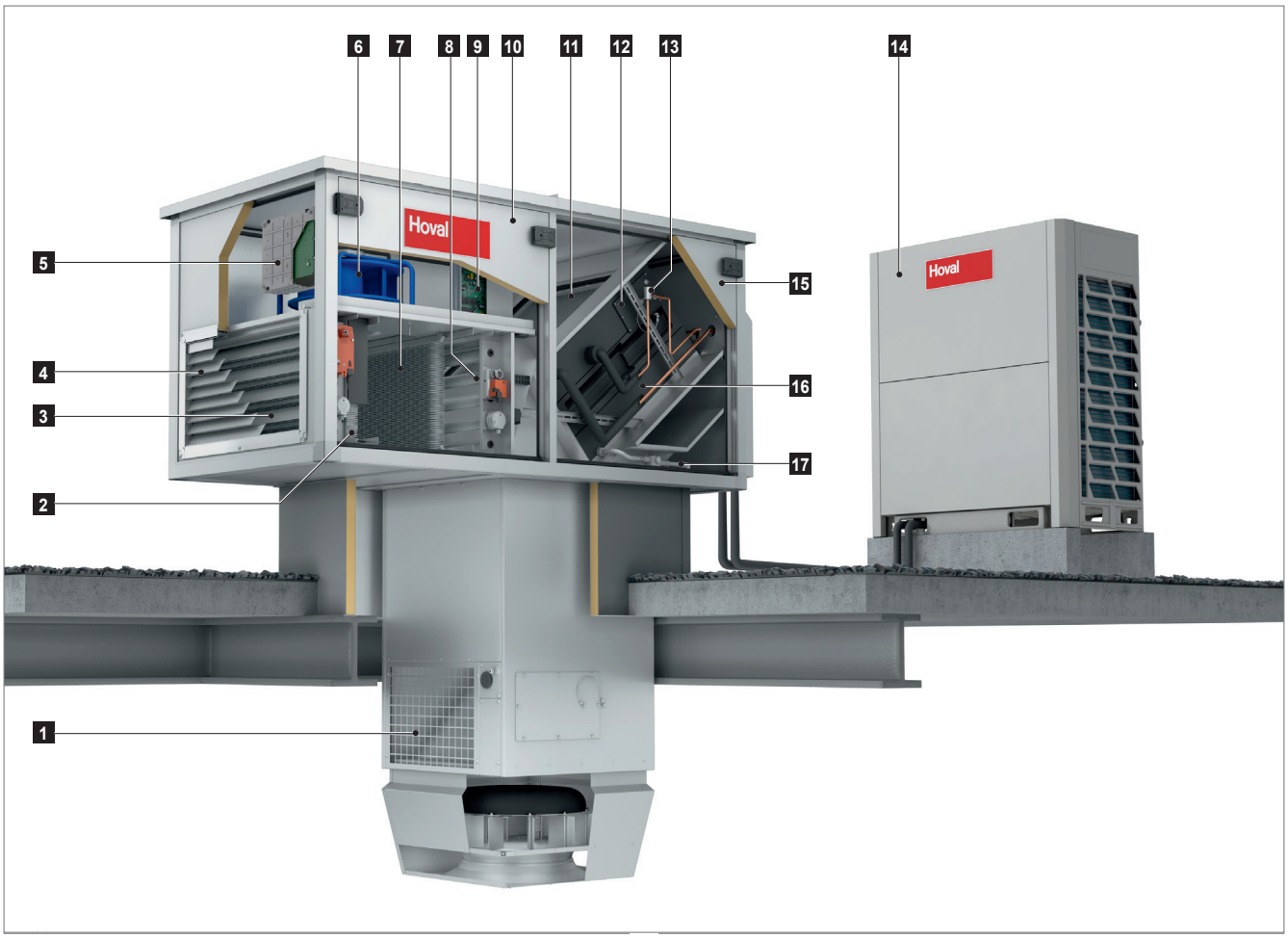
Fig. 3: Construction TopVent® CP-9



1	Extract air	9	Air-Injector
2	Extract air filter with differential pressure switch	10	Supply air
3	Fan with flow rate monitoring	11	Liquid temperature sensor
4	Air inlet temperature sensor heating/cooling coil	12	Expansion valves (supplied loose)
5	Heating/cooling coil	13	Gas temperature sensor (supplied loose)
6	Condensate separator	14	Shut-off valves
7	Supply air temperature sensor	15	Heat pump Belaria® VRF (67)
8	Actuator Air-Injector		

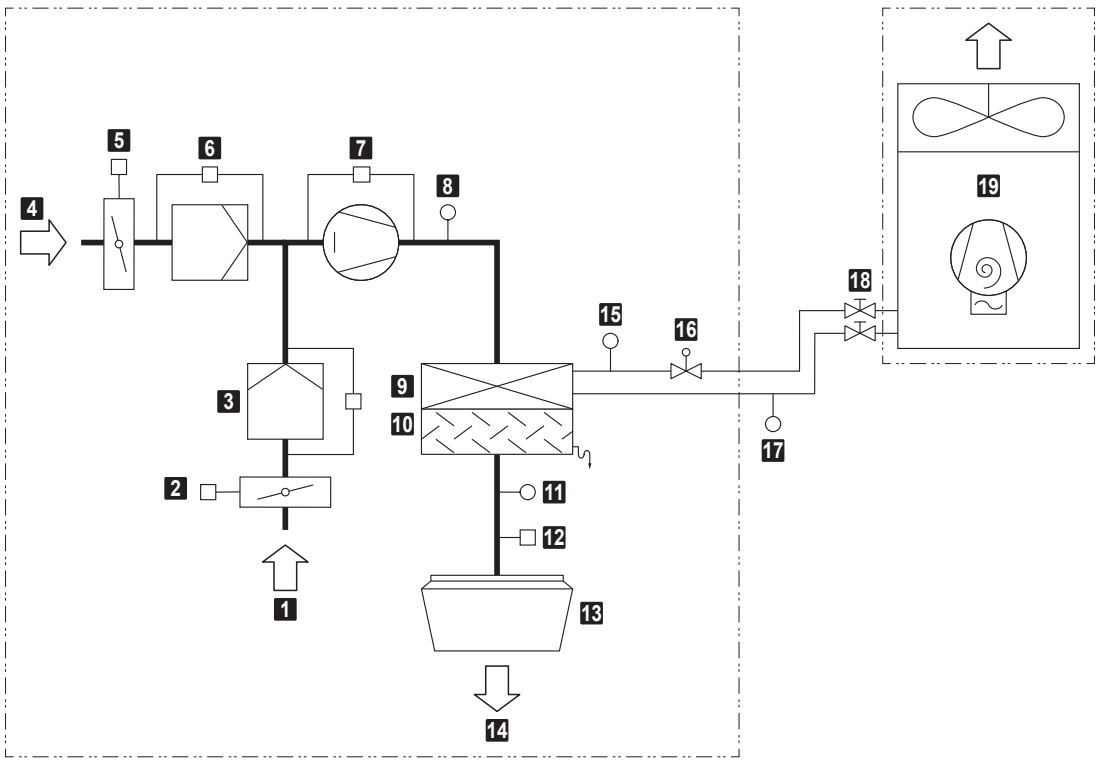
Table 2: Function diagram TopVent® CP-9

3.4 Construction and operation TopVent® SP-6



1	Extract air grille	10	Fan access door
2	Fresh air filter	11	Heating/cooling coil
3	Fresh air damper	12	Access panel, liquid temperature sensor
4	Weather protection	13	Expansion valve (supplied loose)
5	Unit control box	14	Heat pump Belaria® VRF (33, 40)
6	Fan	15	Refrigerant connection access door
7	Extract air filter	16	Condensate separator
8	Recirculation damper	17	Condensate drain
9	Conversion board		

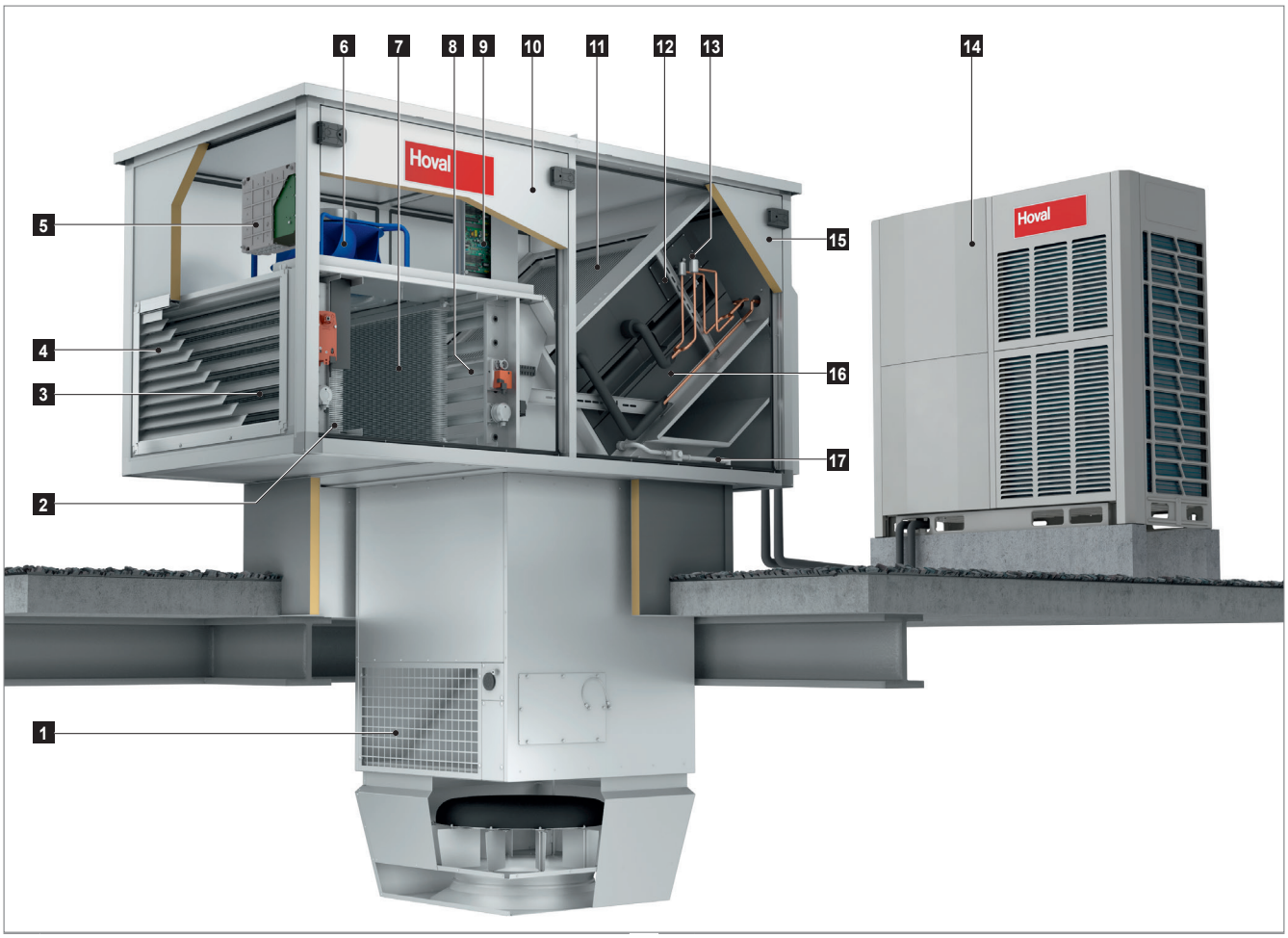
Fig. 4: Construction TopVent® SP-6



1	Extract air	11	Supply air temperature sensor
2	Recirculation damper with actuator	12	Actuator Air-Injector
3	Extract air filter with differential pressure switch	13	Air-Injector
4	Fresh air	14	Supply air
5	Fresh air damper with actuator	15	Liquid temperature sensor
6	Fresh air filter with differential pressure switch	16	Expansion valve (supplied loose)
7	Fan with flow rate monitoring	17	Gas temperature sensor (supplied loose)
8	Mixed air temperature sensor	18	Shut-off valves
9	Heating/cooling coil	19	Heat pump Belaria® VRF (33, 40)
10	Condensate separator		

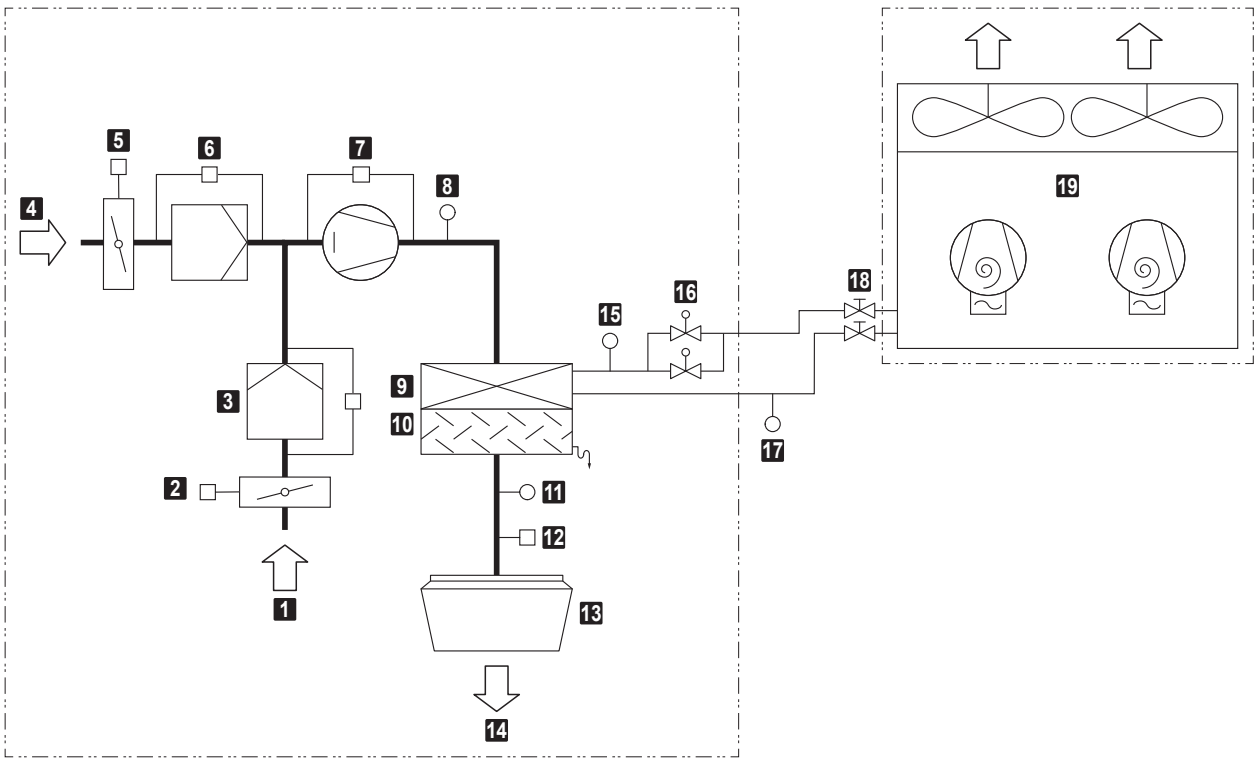
Table 3: Function diagram TopVent® SP-6

3.5 Construction and operation TopVent® SP-9



1	Extract air grille	10	Fan access door
2	Fresh air filter	11	Heating/cooling coil
3	Fresh air damper	12	Access panel, liquid temperature sensor
4	Weather protection	13	Expansion valves (supplied loose)
5	Unit control box	14	Heat pump Belaria® VRF (67)
6	Fan	15	Refrigerant connection access door
7	Extract air filter	16	Condensate separator
8	Recirculation damper	17	Condensate drain
9	Conversion boards		

Fig. 5: Construction TopVent® SP-9



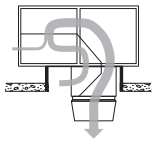
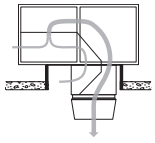
1	Extract air	11	Supply air temperature sensor
2	Recirculation damper with actuator	12	Actuator Air-Injector
3	Extract air filter with differential pressure switch	13	Air-Injector
4	Fresh air	14	Supply air
5	Fresh air damper with actuator	15	Liquid temperature sensor
6	Fresh air filter with differential pressure switch	16	Expansion valves (supplied loose)
7	Fan with flow rate monitoring	17	Gas temperature sensor (supplied loose)
8	Mixed air temperature sensor	18	Shut-off valves
9	Heating/cooling coil	19	Heat pump Belaria® VRF (67)
10	Condensate separator		

Table 4: Function diagram TopVent® SP-9

3.6 Operating modes

The units have the following operating modes:
- Supply air speed 2 (only TopVent® SP)
- Supply air speed 1 (only TopVent® SP)
- Recirculation
- Recirculation speed 1
- Standby

The TopTronic® C control system regulates these operating modes automatically for each control zone in accordance with the specifications in the calendar. The following points also apply:
- The operating mode of a control zone can be switched over manually.
- Each TopVent® unit can operate individually in a local operating mode: Off, Supply air speed 2, Supply air speed 1, Recirculation, Recirculation speed 1 (depending on the unit type)

Code	Operating mode		Description
SA2	**Supply air speed 2** The fan runs at speed 2 (high air flow rate). The room temperature set value day is active. The unit blows fresh air into the room. The control of the fresh air ratio can be selected:		
	<u>Fixed fresh air ratio:</u> The unit operates continuously with the set fresh air ratio. The system controls the heating/cooling according to the heating/cooling demand.		Fan ..... speed 2 Fresh air damper..... 10 % open [1] Heating/cooling ..... 0-100 % [2] [1] Percentage is adjustable [2] Depending on heat or cool demand
	<u>Variable fresh air ratio:</u> ■ The system regulates the fresh air ratio depending on the temperature. The set fresh air ratio serves as a minimum value. If the temperature conditions permit, more fresh air is brought into the room and used for free heating or free cooling. Only when this potential is fully utilised is the heating/cooling switched on via the coil if required. ■ If a combination sensor for room air is installed (option), the system additionally controls the fresh air ratio depending on the air quality. – If there is no heat demand, the fresh air damper is opened 100% if the indoor air quality is too poor. – When the setpoint value for the CO_2 or VOC content of the room air is reached, the fresh air damper closes again to the set minimum value. **Notice** In order to save heating energy, the unit only operates with the set minimum fresh air rate when heat is required.		Fan ..... speed 2 Fresh air damper..... MIN-100 % open [1] Heating/cooling ..... 0-100 % [2] [1] A minimum value can be set [2] Depending on heat or cool demand
SA1	**Supply air speed 1** The same as SA2, but the fan operates at speed 1 (low air flow rate)		Fan ..... speed 1 Fresh air damper..... MIN-100 % open [1] Heating/cooling ..... 0-100 % [1] Fixed or variable (see above)

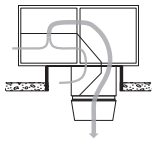
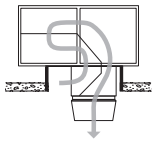
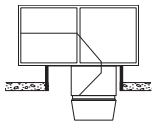
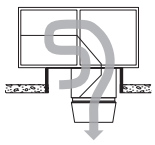
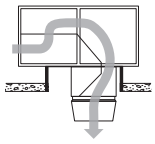
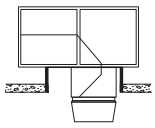
Code	Operating mode		Description
REC	**Recirculation** On/Off operation: during heat or cool demand, the unit draws in room air, heats or cools it and blows it back into the room. The room temperature set value day is active.		Fan ..... speed 1 / 2 [1] Fresh air damper..... closed Heating/cooling ..... on [1] [1] Depending on heat or cool demand
DES	■ Destratification: To avoid heat build-up under the ceiling, it may be appropriate to switch on the fan when there is no heat or cool demand (either in permanent operation or in on/off operation depending on the temperature stratification, as desired).		Fan ..... speed 2 Fresh air damper..... closed Heating/cooling ..... off
REC1	**Recirculation speed 1** The same as REC, but the unit operates only at speed 1 (low air flow rate)		Fan ..... speed 1 Fresh air damper..... closed Heating/cooling ..... on [1] [1] Depending on heat or cool demand
DES	■ Destratification: The same as for REC, but the unit operates only at speed 1		Fan ..... speed 1 Fresh air damper..... closed Heating/cooling ..... off
ST	**Standby** The unit is ready for operation. The following operating modes are activated if required:		
CPR	■ Cooling protection: If the room temperature drops below the set value for cooling protection, the unit heats up the room in recirculation operation.		Fan ..... speed 2 Fresh air damper..... closed Heating ..... on
OPR	■ Overheating protection: If the room temperature rises above the set value for over-heating protection, the unit cools down the room in recirculation operation.		Fan ..... speed 2 Fresh air damper..... closed Cooling..... on
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.		Fan ..... speed 2 Fresh air damper..... open Heating/cooling ..... off
L_OFF	**Off** (local operating mode) The unit is switched off. Frost protection for the unit remains active.		Fan ..... off Fresh air damper..... closed Heating/cooling ..... off

Table 5: Operating modes

4 Type code

CP - 6 - J / ST . V1 . D1 / -- . CA . Z / - . -- / TC . -- . --

Unit type

CP	TopVent® CP
SP	TopVent® CP

Unit size

6 or 9

Heating/cooling section

J	with coil type J for Belaria® VRF (33)
L	with coil type L for Belaria® VRF (40)
N	with coil type N for Belaria® VRF (67)

Design

ST	Standard

Connection module

V1	Standard
V2	Length + 450 mm
V3	Length + 900 mm

Air outlet

D1	Design with Air-Injector
D0	Design without Air-Injector
DB	Air distribution box

Surface

--	Standard
CA	Coating of roof unit (anthracite grey)
LU	Paint finish of below-roof unit (as desired)
CL	Coating of roof unit and paint finish of below-roof unit

Silencer

-	without
Z	Supply air silencer

Control system

TC	TopTronic® C

Table 6: Type code

5 Technical data

5.1 Application limits

Heating mode				
Fresh air temperature		min. max.	°C °C	-25 24
Air inlet temperature to the heating/cooling coil		min. max.	°C °C	5 30
Cooling mode				
Fresh air temperature		min. max.	°C °C	-15 48
Air inlet temperature to the heating/cooling coil		min. max.	°C °C	17 32
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	15
Air flow rate	Size 6: Size 9:	min. min.	m³/h m³/h	3100 5000
Condensate quantity	Size 6: Size 9:	max. max.	kg/h kg/h	90 150
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 7: Application limits

5.2 Electrical connection

TopVent® CP, SP

Unit type		CP-6	CP-9	SP-6	SP-9
Supply voltage	V AC	3 × 400	3 × 400	3 × 400	3 × 400
Permitted voltage tolerance	%	± 5	± 5	± 5	± 5
Frequency	Hz	50	50	50	50
Connected load	kW	2.1	3.3	2.2	3.4
Current consumption max.	A	3.7	5.9	3.7	5.9
Series fuse	A	13.0	13.0	13.0	13.0
Protection rating	–	IP 54	IP 54	IP 54	IP 54

Table 8: Electrical connection TopVent® CP, SP

Heat pump Belaria® VRF

Heat pump Belaria®		VRF (33)	VRF (40)	VRF (67)
Supply voltage	V AC	3 × 400	3 × 400	3 × 400
Permitted voltage tolerance	%	± 2	± 2	± 2
Frequency	Hz	50	50	50
Connected load	kW	16.5	20.6	34.0
Current consumption max.	A	26.4	33.1	54.5
Series fuse	A	32.0	40.0	63.0
Inrush current	A	–	–	–

Table 9: Electrical connection Belaria® VRF

5.3 Air flow rate

Unit type		CP-6	CP-9	SP-6	SP-9
Nominal air flow rate	m³/h	6000	9000	6000	9000
Floor area covered ■ for applications with higher comfort requirements (e.g. production halls, assembly halls, sports halls)	m²	537	946	537	946
■ for applications with low comfort requirements (e.g. warehouses, logistics centres)	m²	953	1674	–	–

Table 10: Air flow rate

5.4 Air filtration

Filter	Fresh air / Extract air
Class acc. to ISO 16890	ISO ePM_1 55 %
Class acc. to EN 779	F7
Factory setting of differential pressure switches	300 Pa

Table 11: Air filtration

5.5 Technical data of the Belaria® VRF heat pump

Heat pump Belaria®			VRF (33)	VRF (40)	VRF (67)
Heating	Rated heat output [1]	kW	33.5	40.0	67.0
	Power consumption	kW	7.60	8.51	15.33
	COP	–	4.40	4.70	4.37
	$\eta_{s,h}$	–	173	169	151
	SCOP	–	4.41	4.31	3.86
Cooling	Rated cooling capacity [2]	kW	33.5	40.0	67.0
	Power consumption	kW	8.90	9.88	18.10
	EER	–	3.75	4.05	3.70
	$\eta_{s,c}$	–	285	246	277
	SEER	–	7.20	6.22	7.00
Refrigerant		–	R410A	R410A	R410A
Refrigerant fill volume		kg	11	13	22

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 12: Technical data Belaria® VRF

5.6 Sound level

Unit type			CP-6		CP-9	
			indoors	outdoors	indoors	outdoors
Sound pressure level (at a distance of 5 m) [1]		dB(A)	55	42	59	46
Total sound power level		dB(A)	77	64	81	68
Octave sound power level	63 Hz	dB	45	40	47	42
	125 Hz	dB	61	55	65	59
	250 Hz	dB	67	57	70	60
	500 Hz	dB	71	60	73	62
	1000 Hz	dB	74	57	78	61
	2000 Hz	dB	70	56	76	62
	4000 Hz	dB	66	47	71	52
	8000 Hz	dB	65	39	66	40

1) with a hemispherical radiation pattern in a low-reflection room

Table 13: Sound level TopVent® CP

Unit type			SP-6		SP-9	
			indoors	outdoors	indoors	outdoors
Sound pressure level (at a distance of 5 m) [1]		dB(A)	55	47	59	50
Total sound power level		dB(A)	77	69	81	72
Octave sound power level	63 Hz	dB	45	44	47	45
	125 Hz	dB	61	55	65	58
	250 Hz	dB	67	63	70	64
	500 Hz	dB	71	65	73	66
	1000 Hz	dB	74	60	78	65
	2000 Hz	dB	70	59	76	65
	4000 Hz	dB	66	56	71	61
	8000 Hz	dB	65	57	66	57

1) with a hemispherical radiation pattern in a low-reflection room

Table 14: Sound level TopVent® SP

Heat pump Belaria®			VRF (33)	VRF (40)	VRF (67)
Sound pressure level (at a distance of 5 m)		dB(A)	59.0	63.0	67.0
Total sound power level [1]		dB(A)	81.0	85.0	89.0
Octave sound pressure level [2]	63 Hz	dB	62.6	63.5	66.5
	125 Hz	dB	60.6	61.2	65.0
	250 Hz	dB	61.0	60.8	65.0
	500 Hz	dB	58.3	57.5	63.0
	1000 Hz	dB	55.5	56.9	57.0
	2000 Hz	dB	46.8	47.5	52.0
	4000 Hz	dB	43.9	45.1	51.0
	8000 Hz	dB	43.5	44.1	50.2

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 1.3 m above the floor in a semi-anechoic chamber.

Table 15: Sound level Belaria® VRF

5.7 Heat output

TopVent® CP recirculation unit

t_F	t_{room}	Type	Q	H_{max}	t_S	P_{HP}
°C	°C	CP-	kW	m	°C	kW
-15	16	6-J	28.6	14.2	32.2	9.2
		6-L	34.2	13.2	34.9	10.3
		9-N	57.2	13.4	36.9	18.5
	20	6-J	28.5	14.3	36.1	9.4
		6-L	34.0	13.3	38.8	10.5
		9-N	57.0	13.5	40.8	18.9

Legend:
t_F = Fresh air temperature
t_{room} = Room air temperature
Q = Heat output
H_{max} = Maximum mounting height
t_S = Supply air temperature
P_{HP} = Power consumption of the heat pump

Reference:
- At room air temperature 16 °C: extract air temperature 18 °C
- At room air temperature 20 °C: extract air temperature 22 °C

Table 16: Heat output TopVent® CP

TopVent® SP supply air unit

t_F	t_{room}	Type	Q	H_{max}	t_S	P_{HP}
°C	°C	SP-	kW	m	°C	kW
-15	16	6-J	28.7	15.8	28.9	9.1
		6-L	34.3	14.4	31.7	10.2
		9-N	57.5	14.5	33.7	18.3
	20	6-J	28.6	16.1	32.5	9.2
		6-L	34.2	14.7	35.2	10.3
		9-N	57.2	14.7	37.2	18.5

Legend:
t_F = Fresh air temperature
t_{room} = Room air temperature
Q = Heat output
H_{max} = Maximum mounting height
t_S = Supply air temperature
P_{HP} = Power consumption of the heat pump

Reference:
- At room air temperature 16 °C: extract air temperature 18 °C
- At room air temperature 20 °C: extract air temperature 22 °C
- Fresh air ratio 10 %

Table 17: Heat output TopVent® SP

5.8 Cooling capacity

TopVent® CP recirculation unit

t_F	t_{room}	RH_{room}	Type	Q_{sen}	Q_{tot}	t_S	m_C	P_{HP}
°C	°C	%	CP-	kW	kW	°C	kg/h	kW
32	26	50	6-J	23.3	34.0	16.5	15.8	8.1
			6-L	27.7	40.6	14.3	18.9	9.2
			9-N	47.1	68.0	12.5	30.7	16.9
		70	6-J	17.6	34.9	19.3	25.5	8.2
			6-L	20.9	41.7	17.6	30.5	9.3
			9-N	35.5	69.9	16.3	50.3	17.0

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

Reference:
- At room air temperature 22 °C: extract air temperature 24 °C
- At room air temperature 26 °C: extract air temperature 28 °C

Table 18: Cooling capacity TopVent® CP

TopVent® SP supply air unit

t_F	t_{room}	RH_{room}	Type	Q_{sen}	Q_{tot}	t_S	m_C	P_{HP}
°C	°C	%	SP-	kW	kW	°C	kg/h	kW
32	26	50	6-J	23.4	34.0	16.8	15.6	8.1
			6-L	27.9	40.6	14.6	18.6	9.2
			9-N	47.4	68.0	12.8	30.3	16.9
		70	6-J	17.7	34.9	19.6	25.3	8.2
			6-L	21.1	41.7	17.9	30.2	9.3
			9-N	35.9	69.9	16.6	50.0	17.0

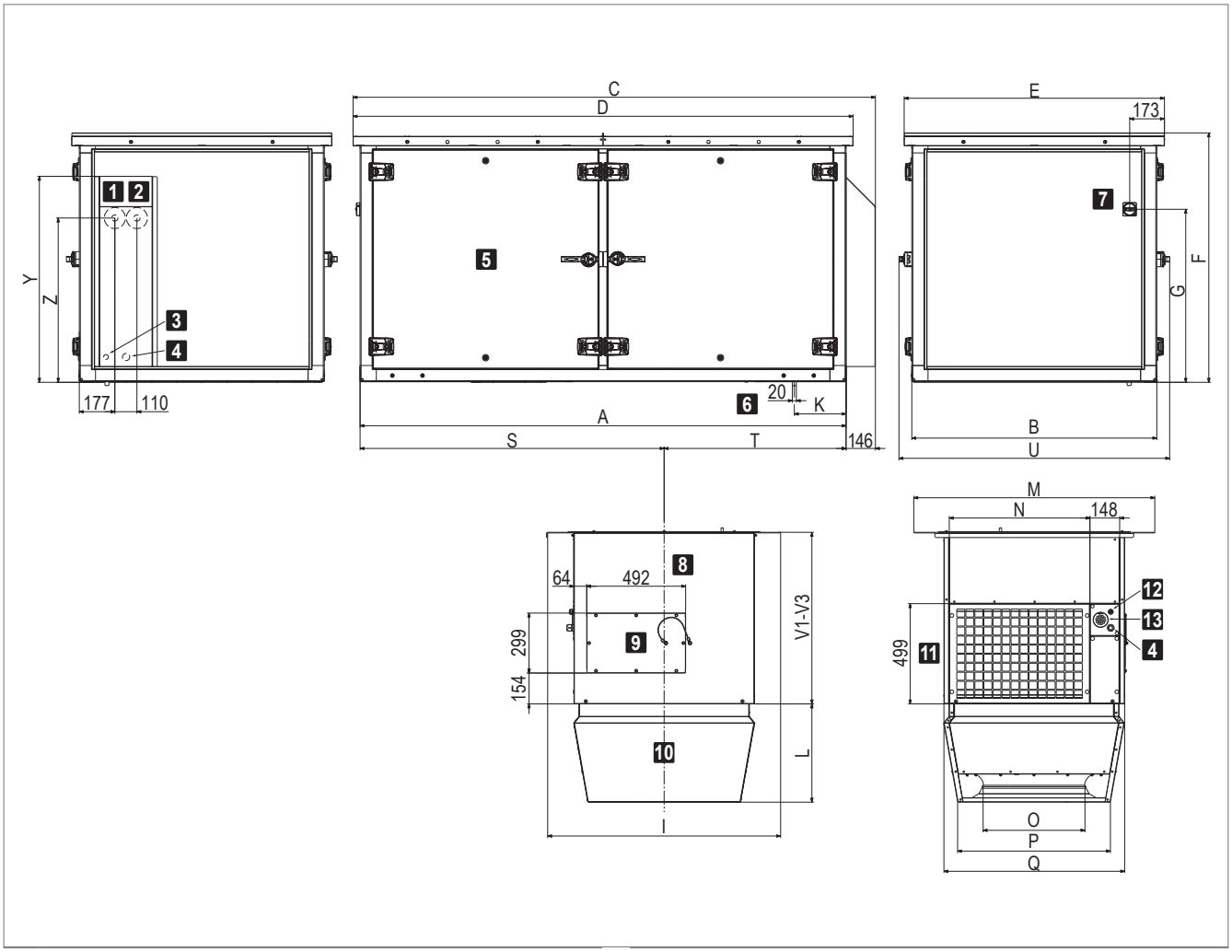
Legend:
t_F = Fresh air temperature
t_{room} = Room air temperature
RH_{room} = Relative humidity of the room air
Q_{sen} = Sensible cooling capacity
Q_{tot} = Total cooling capacity
t_S = Supply air temperature
m_C = Condensate quantity
P_{HP} = Power consumption of the heat pump

Reference:
- At room air temperature 22 °C: extract air temperature 24 °C
- At room air temperature 26 °C: extract air temperature 28 °C
- Fresh air ratio 10 %

Table 19: Cooling capacity TopVent® SP

5.9 Dimensions and weights

TopVent® CP



1	Feedthrough for gas line (∅ 23…75 mm)	8	Connection module
2	Feedthrough for liquid line (∅ 23…75 mm)	9	Installation lid
3	Cable feedthrough for signal cables heat pump	10	Air-Injector
4	Cable feedthrough for power supply heat pump	11	Extract air grille
5	Roof unit	12	Cable feedthrough for power supply TopVent®
6	Condensate drain	13	Cable feedthrough for signal cables
7	Isolation switch		

Table 20: TopVent® CP dimensional drawing (dimensions in mm)

Unit type		CP-6	CP-9
A	mm	2420	2725
B	mm	1220	1420
C	mm	2601	2906
D	mm	2490	2795
E	mm	1290	1490
F	mm	1239	1439
G	mm	862	962
I	mm	1160	1360
K	mm	257	292
L	mm	490	570
M	mm	1200	1400
N	mm	701	901
O	mm	500	630
P	mm	767	937
Q	mm	900	1100
S	mm	1514	1684
T	mm	906	1041
U	mm	1348	1548
V1	mm	850	850
V2	mm	1300	1300
V3	mm	1750	1750
Y	mm	1025	1125
Z	mm	818	935

Table 21: TopVent® CP dimensions

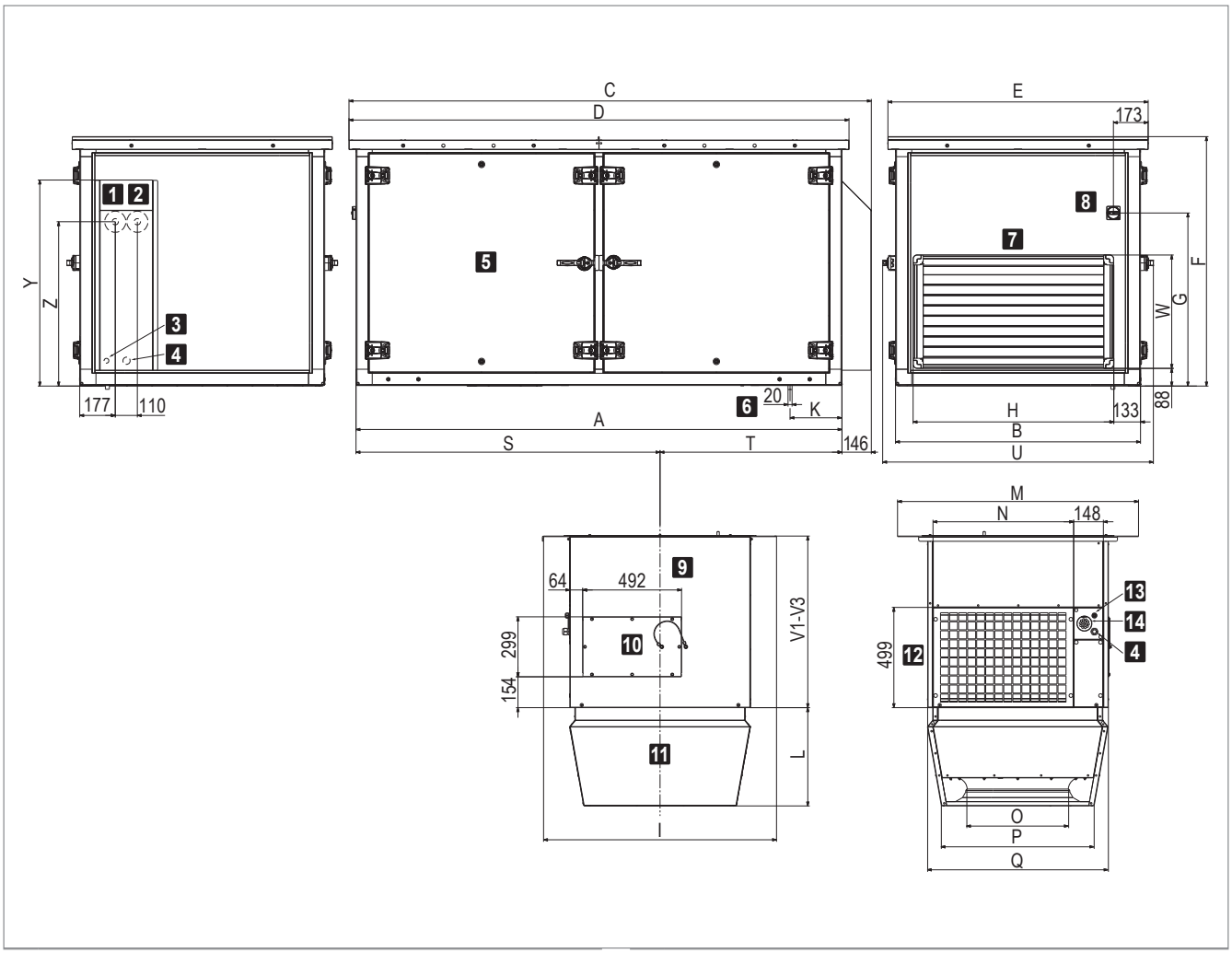
Unit type		CP-6	CP-9
Gas line connection	mm	∅ 28	∅ 28
Liquid line connection	mm	∅ 12	∅ 22

Table 22: Refrigerant pipe connections in the roof unit

Unit type		CP-6	CP-9
Total	**kg**	**672**	**869**
Roof unit	kg	530	687
Below-roof unit	kg	142	182
Air-Injector	kg	40	57
Connection module V1	kg	102	125
Additional weight V2	kg	+ 42	+ 50
Additional weight V3	kg	+ 85	+ 101

Table 23: TopVent® CP weights

TopVent® SP



1	Feedthrough for gas line (∅ 23…75 mm)	8	Isolation switch
2	Feedthrough for liquid line (∅ 23…75 mm)	9	Connection module
3	Cable feedthrough for signal cables heat pump	10	Installation lid
4	Cable feedthrough for power supply heat pump	11	Air-Injector
5	Roof unit	12	Extract air grille
6	Condensate drain	13	Cable feedthrough for power supply TopVent®
7	Weather protection	14	Cable feedthrough for signal cables

Table 24: TopVent® SP dimensional drawing (dimensions in mm)

Unit type		SP-6	SP-9
A	mm	2420	2725
B	mm	1220	1420
C	mm	2601	2906
D	mm	2490	2795
E	mm	1290	1490
F	mm	1239	1439
G	mm	862	962
H	mm	999	1199
I	mm	1160	1360
K	mm	257	292
L	mm	490	570
M	mm	1200	1400
N	mm	701	901
O	mm	500	630
P	mm	767	937
Q	mm	900	1100
S	mm	1514	1684
T	mm	906	1041
U	mm	1348	1548
V1	mm	850	850
V2	mm	1300	1300
V3	mm	1750	1750
W	mm	565	664
Y	mm	1025	1125
Z	mm	818	935

Table 25: TopVent® SP dimensions

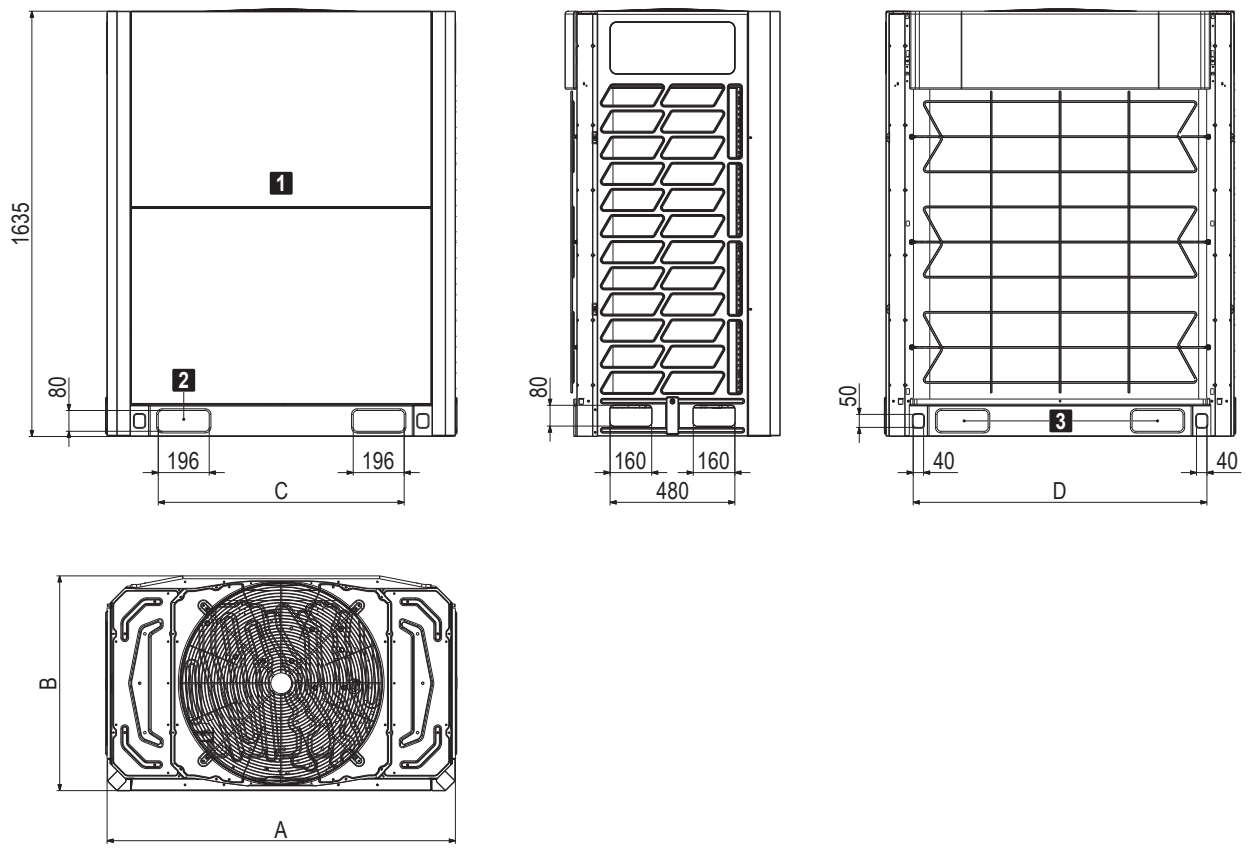
Unit type		SP-6	SP-9
Gas line connection	mm	∅ 28	∅ 28
Liquid line connection	mm	∅ 12	∅ 22

Table 26: Refrigerant pipe connections in the roof unit

Unit type		SP-6	SP-9
Total	**kg**	**717**	**924**
Roof unit	kg	575	742
Below-roof unit	kg	142	182
Air-Injector	kg	40	57
Connection module V1	kg	102	125
Additional weight V2	kg	+ 42	+ 50
Additional weight V3	kg	+ 85	+ 101

Table 27: TopVent® SP weights

Belaria® VRF (33, 40)

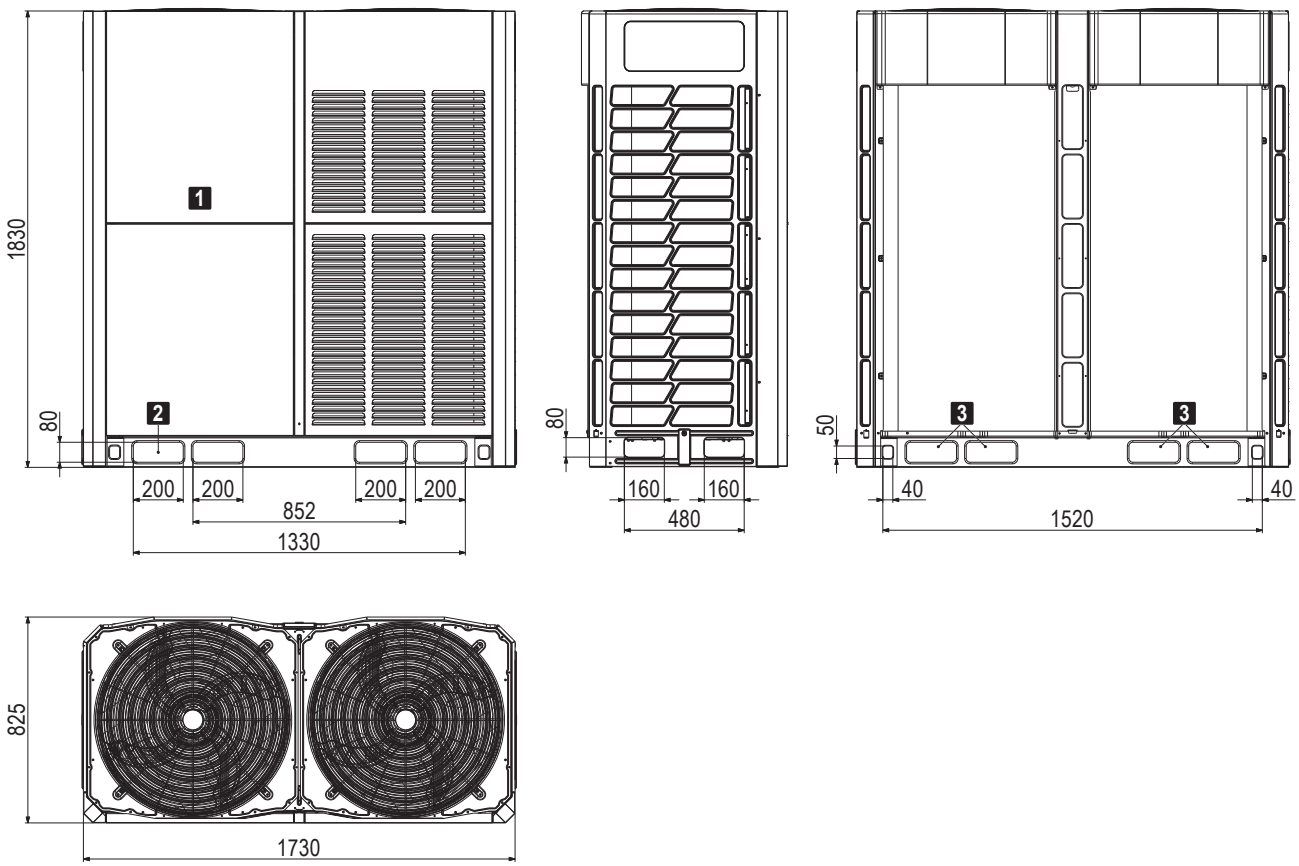


1	Access door		
2	Connection of refrigerant pipes and cabling		
	VRF(33):	Liquid line connection	∅ 15.9 mm
		Gas line connection	∅ 28.6 mm
	VRF(40):	Liquid line connection	∅ 15.9 mm
		Gas line connection	∅ 31.8 mm
3	Openings for forklift		

Heat pump Belaria®		VRF (33)	VRF (40)
A	mm	990	1340
B	mm	790	825
C	mm	596	946
D	mm	780	1130
Weight	kg	227	277

Fig. 6: Dimensions and weights Belaria® VRF (33, 40)

Belaria® VRF (67)



1	Access door	
2	Connection of refrigerant pipes and cabling	
	VRF(67): Liquid line connection	∅ 19.1 mm
	Gas line connection	∅ 31.8 mm
3	Openings for forklift	

Heat pump Belaria®		VRF (67)
Weight	kg	430

Fig. 7: Dimensions and weights Belaria® VRF (67)

6 Options

6.1 Connection module

The connection module is available in 3 lengths for adapting the unit to local conditions. The connection module V3 is equipped with 2 installation lids.

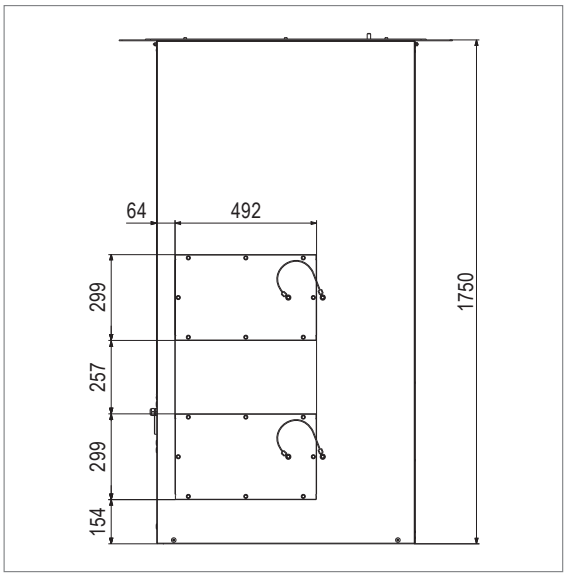


Fig. 8: Installation lids in connection module V3

6.2 Design without Air-Injector

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

6.3 Air distribution box

For easy connection to ventilation ducts or fabric sleeves, TopVent® units are available with an air distribution box. This has a collar on 2 opposite sides as a connection piece to the on-site air distribution system.
The air distribution box replaces the Air-Injector.

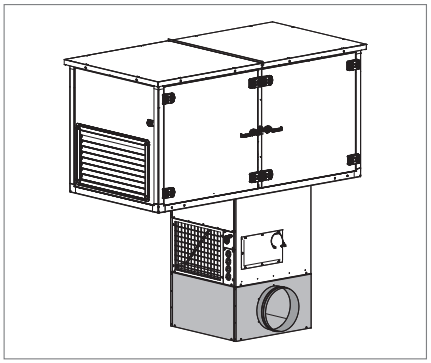


Fig. 9: TopVent® unit with air distribution box

6.4 Coating of roof unit

The casing of the roof unit is made of coated zinc sheet (anthracite grey, similar to RAL 7016).

6.5 Paint finish of below-roof unit

The below-roof unit is provided with an exterior painting in choice of RAL colour.

6.6 Supply air silencer

The supply air silencer reduces noise emissions from TopVent® units. It consists of a sound-absorbing mat made of melamine foam and is mounted above the fan on the casing ceiling. Weight: 20 kg.

6.7 Roof frame

For easy installation of the TopVent® units in the roof, suitable roof frames are available as accessories. The roof frames consist of 4 load-bearing side walls made of galvanised sheet steel with fastening rails for the roof foil.

6.8 Protection hood

To protect the fresh air inlet from strong winds and snowfall, protection hoods are available as accessories for TopVent® supply air units.

6.9 Options for the heat pump

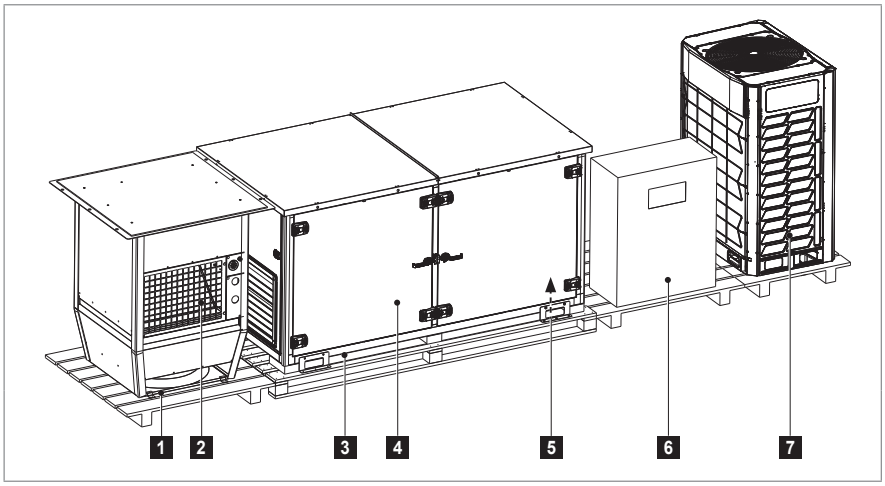
Protection hood
To protect the heat pump from strong winds and snowfall, protection hoods are available as accessories. They are supplied loose with the appropriate connecting screws for assembly on site.

7 Transport and installation

Caution
Risk of injury from incorrect handling. Transport, assembly and installation work may only be performed by specialists. Observe safety and accident prevention regulations.

7.1 Scope of delivery

The scope of delivery includes:
- TopVent® unit including conversion board, delivered in 2 parts on pallets (roof unit, below-roof unit)
- Heat pump Belaria® VRF
- Accessories (lifting kit, transport eyes, installation material, expansion valve, temperature sensors)
- Optional components



1	TopVent® below-roof unit
2	Extract air grille
3	TopVent® roof unit
4	Fan access door
5	Drawing pocket, type label
6	Zone control panel
7	Heat pump Belaria® VRF

Fig. 10: Delivery of the components on pallets

Accessories
The following accessories are supplied separately:
- Transport eyes for lifting the below-roof unit (2 pieces per order, in the first roof unit, in the cardboard box behind the fan access door)
- Screws for assembling the unit (in the first roof unit, in the cardboard box behind the fan access door)
- Operating manual and CE declaration of conformity (1 × per order, in the first roof unit, in the cardboard box behind the fan access door)
- Spacer bars as transport protection for the roof unit (4 pieces per order, in the first roof unit)
- Keys for operating the latch hinges and quarter turns (2 pieces per order, attached to the door handles on the first roof unit)
- 1 cartridge of Sikaflex® 221 (sealing compound for the roof frame, in the cardboard box behind the fan access door)
- Wiring diagram (in the drawing pocket)
- Gas temperature sensor (in the cardboard box behind the fan access door)
- Expansion valve (in the cardboard box behind the fan access door, 1 × for size 6, 2 × for size 9)
- Branching kit for the refrigerant pipe (in the cardboard box behind the fan access door, only for size 9)

- Cover for the connections (behind the fan access door)
- Fresh air sensor and room air temperature sensor (in the zone control panel)

Options

The following optional components are supplied separately:

- Roof frame
- Additional room temperature sensors, combination sensor room air quality, temperature and humidity (in zone control panel)
- 2 collars for the air distribution box (behind the extract air grille)
- Protection hood
- Options for the heat pump:
  - Protection hoods (on separate pallet)

Preparation

- Use a forklift with a sufficiently long fork to unload (at least 1.8 m).
- Check the consignment against the delivery documents and the order confirmation to ensure that it is complete. Report missing parts and any damage immediately in writing.

Heat pump Belaria® VRF

- Lifting the heat pump with a forklift:
  - Lift the unit under the pallet.
  - Unloading from the pallet: Guide the forklift tines into the large rectangular openings under the device.
- Lifting the heat pump with a crane:
  - Use 2 straps at least 8 m in length.

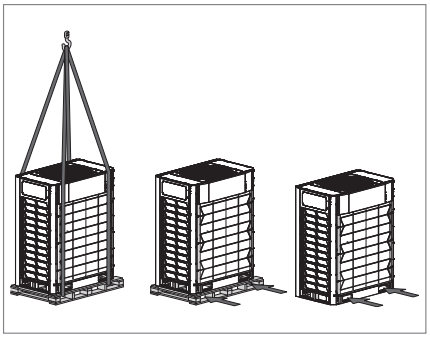


Fig. 11: Lifting the heat pump

7.2 Storage

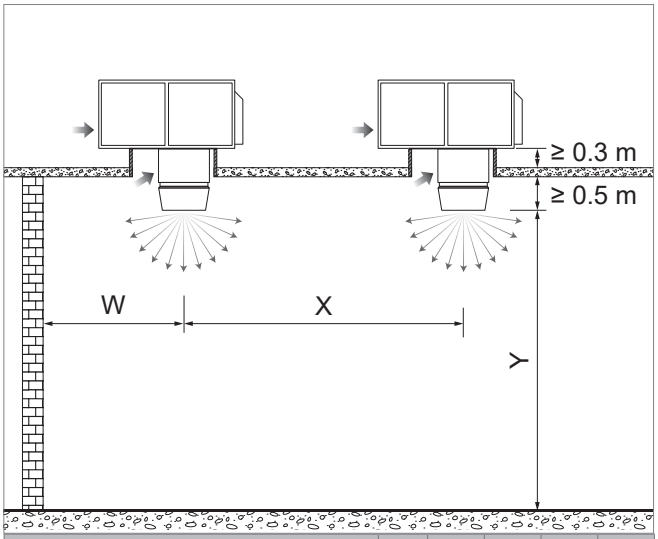
If you do not install the unit immediately:

- Remove the packaging film to avoid water vapour condensation.
- Store the unit in a dry, dust-free room.
- Keep the storage temperature between –30 °C and +50 °C.
- Avoid too long storage periods. After a storage period of more than 1 year:
  - Check that the bearings of the fans move smoothly before installing the unit.

7.3 Requirements for the installation site

TopVent® unit

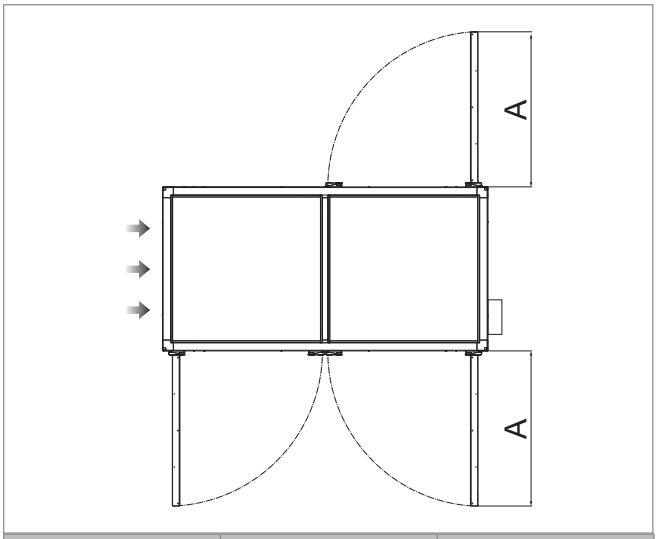
- Comply with the minimum and maximum distances.
- All air inlet and air outlet openings must be freely accessible. The supply air jet must be free to spread out unhindered.
- The access doors in the roof unit must be freely accessible and there must be sufficient space for maintenance work.
- Make sure that supply air units draw in fresh air through the fresh air damper:
  - Not impaired by exhaust air openings, flues or the like
  - Roof frame protruding at least 300 mm from the roof



Unit type			CP-6	CP-9	SP-6	SP-9
Mounting height Y	max. [1]	m	Approx. 9...25			
	min.	m	4	5	4	5
Applications with higher comfort requirements						
■ Distance from wall W	max.	m	12	16	12	16
	min.	m	6	7	6	7
■ Unit clearance X	max.	m	23	31	23	31
	min.	m	12	14	12	14
Applications with low comfort requirements						
■ Distance from wall W	max.	m	15	20	–	–
	min.	m	6	7	–	–
■ Unit clearance X	max.	m	30	41	–	–
	min.	m	12	14	–	–

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)

Fig. 12: Minimum and maximum distances



Size	6	9
A	1165	1315

Fig. 13: Space requirements for opening the access doors (dimensions in mm)

Heat pump Belaria® VRF

- 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 in potentially explosive atmospheres
  - Not in the vicinity of machines emitting electromagnetic waves
  - Not in locations where there is a fire hazard due to the escape of flammable gases
  - 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

> **Caution**
> Risk of damage to health. Corrosion of refrigerant pipes causes leaks and refrigerant can escape.

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

> **Notice**
> If protection hoods are mounted, proportionally more space is required for good accessibility during maintenance work.

- 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 made of concrete or steel:
  - The base must be at least 200 mm high to allow sufficient space for the installation of the pipelines.
  - The base must be flat and level. The support points must bear the weight evenly.
  - Water must be free to drain through the base plate of the heat pump.
- In areas with heavy snowfall:
  - Increase the base height to ensure that the unit operation is not affected by snow.
  - Protect the heat pump with protection hoods (option).

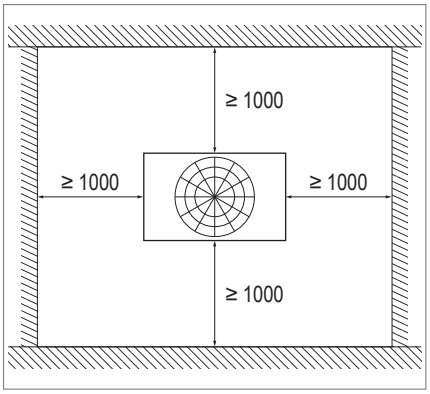
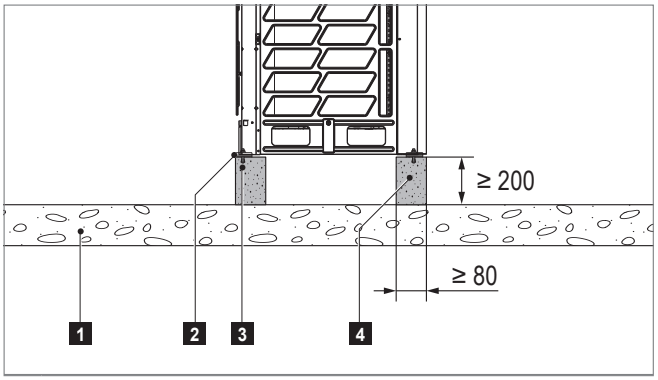


Fig. 14: Minimum distances for the heat pump (dimensions in mm)

7.4 Installing the heat pump

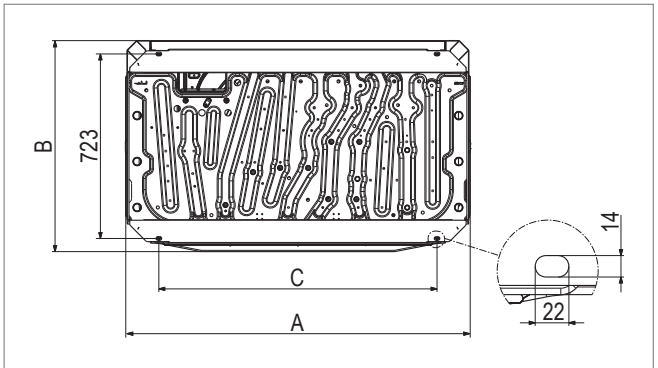
Caution
Risk of injury caused by falling load and improper handling.
During installation:
– Wear personal protective equipment.
– Do not stand under suspended loads.
– Use cranes or forklifts with sufficient load-bearing capacity.

- Transport the heat pump to the installation site.
- Drill holes for the expansion anchors in the prepared base (dimensions see Table 28).
- Mount the heat pump on the base using vibration dampers and 4 expansion anchors ∅ 10 mm.



1	Firm ground
2	Vibration damper
3	Expansion anchor ∅ 10 mm
4	Base made of concrete or steel

Fig. 15: Base for the heat pump



Dimension	VRF (33)	VRF (40)	VRF (67)
A	990	1340	1730
B	790	825	825
C	740	1090	1480

Table 28: Position of the screw connections (dimensions in mm)

Mounting the protection hoods

Protection hoods for the heat pump (option) are supplied loose, consisting of 2 side plates and 1 cover plate. They must be fitted to the unit at the building site. The mounting material is provided. Proceed as follows:

- Only for Belaria® VRF (67): Prepare the heat pump for the installation of the rear protection hoods.
  - Unscrew the protective grid.
  - Instead of the protective grid, screw the enclosed adapters to the heat pump with the same screws (see Fig. 16).

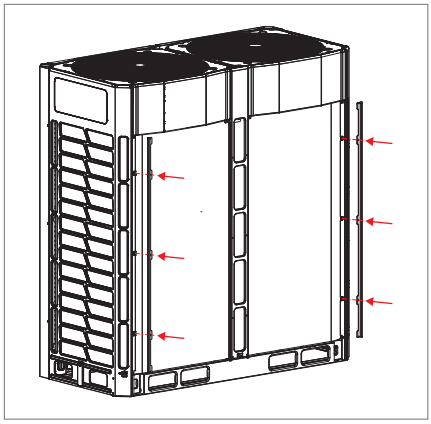


Fig. 16: Mounting the adapters

- Determine the correct position of the protection hood on the heat pump using dimensions E and F (see Fig. 18 and Table 29).
- Mark the position of the screws on the heat pump and pre-drill the holes with a Ø 3.5 mm drill.
  - Use the side plates as a template.
- Mount both side plates to the heat pump using the 4.2 x 13 drilling screws.
- Place the cover plate in position and fit it using the M4 x 10 screws.

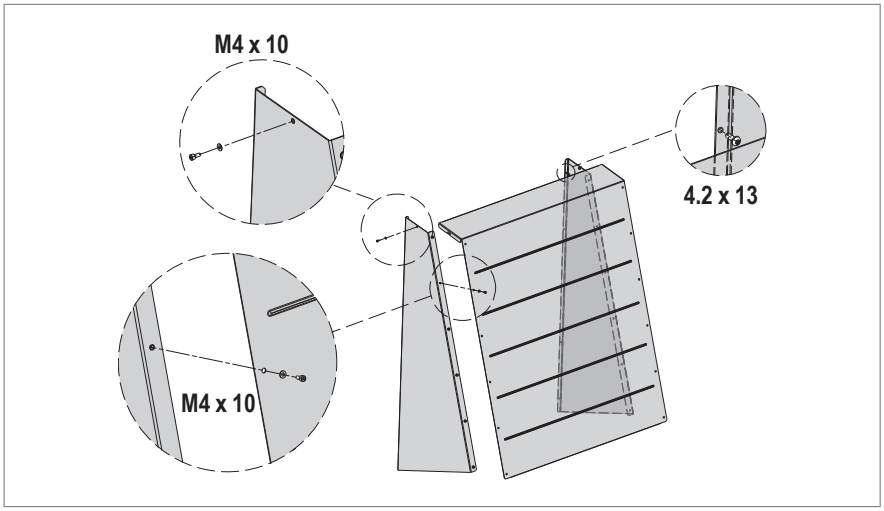


Fig. 17: Mounting the protection hoods

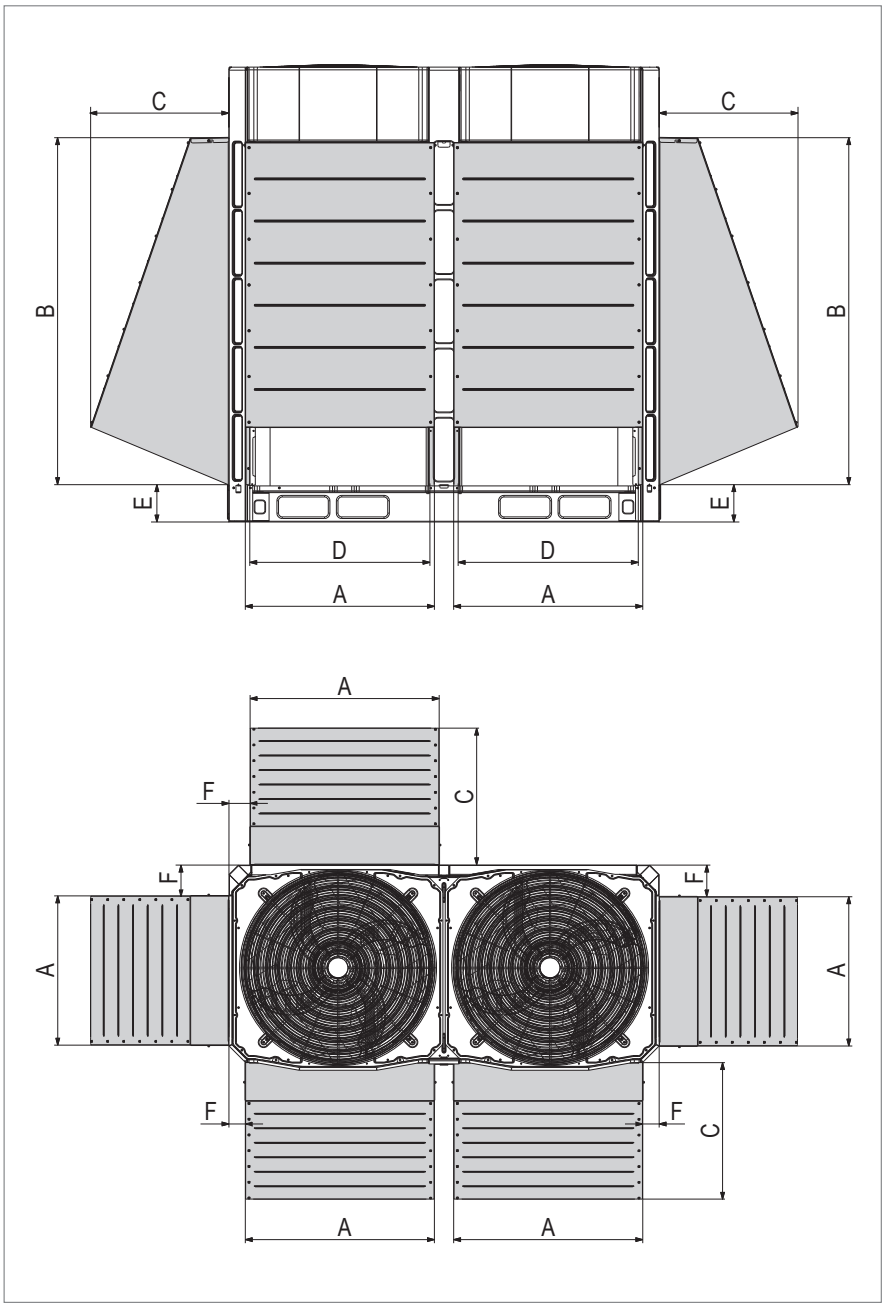
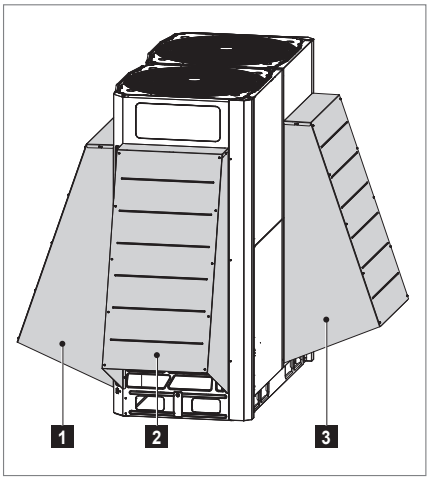


Fig. 18: Protection hoods dimensional drawing using the example of Belaria® VRF (67)



1 Rear protection hood
2 Side protection hood
3 Front protection hood

Fig. 19: Belaria® VRF (67) heat pump with protection hoods

Belaria®	Protection hood		Qty.	A	B	C	D	E	F
VRF (33)	Side	PS-33	2	578	1222	497	546	150	91
	Rear	PR-33	1	842	1222	497	810	154	75
VRF (40)	Side	PS-40	2	578	1222	497	546	150	91
	Rear	PR-40	1	1192	1222	497	1160	112	74
VRF (67)	Side	PS-67	2	600	1396	557	568	150	124
	Rear	PR-67	2	760	1378	550	724	150	66
	Front	PF-67	1	760	1378	550	724	150	85

Table 29: Quantity and dimensions of protections hoods (in mm)

7.5 Installing the TopVent® unit

Caution
Risk of injury caused by falling load and improper handling.
During installation:
– Wear personal protective equipment.
– Do not stand under suspended loads.
– Use cranes or forklifts with sufficient load-bearing capacity.

Caution
Provide suitable protective devices and make sure the units can be accessed easily. The roof of the TopVent® units cannot be walked on.

Preparation

- The units are assembled from roof level. Make sure that the following items are on hand for the assembly:
  – Crane or helicopter for assembly on the roof
  – Ladder for screwing in the transport eyes
  – Lifting gear (lifting ropes at least 2 m in length for the below-roof unit, lifting straps at least 3 m in length for the roof unit)
- Roof unit:
  – Remove the roof unit from the packaging film.
- Below-roof unit:
  – Remove the below-roof unit from the packaging film.
  – Remove the mounting bracket or wooden slats with which the below-roof unit is fixed to the pallet.

Installing the below-roof unit

- Fasten the adjustment screws M8 x 9/30 with nuts in the roof frame.
  – Do not use washers.

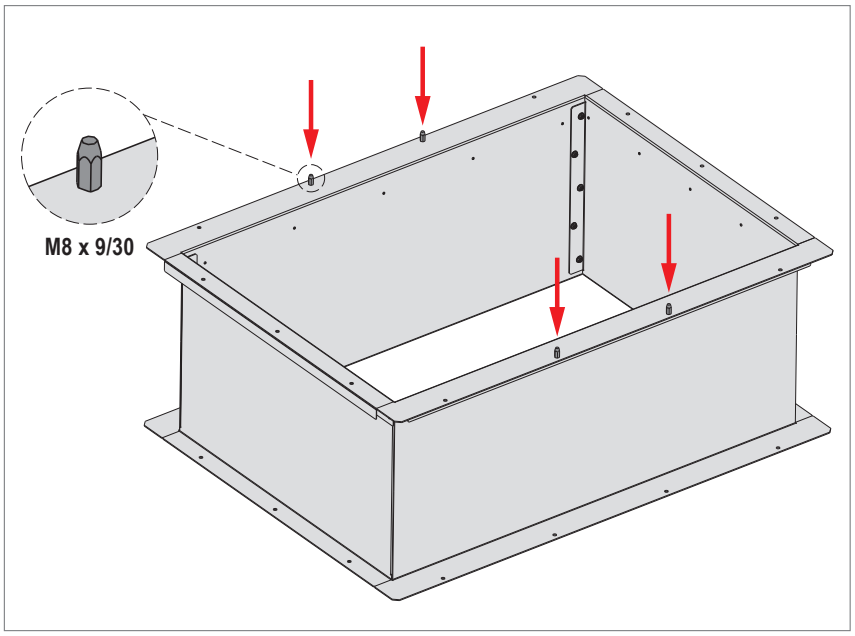


Fig. 20: Adjustment screws in the roof frame

- Apply sealing compound to the roof frame (see Fig. 21):
  – Apply the sealing compound evenly and in a straight line close to the outer edge (max. 20 mm distance from the edge).
  – Run the sealing bead around the inside of the holes.

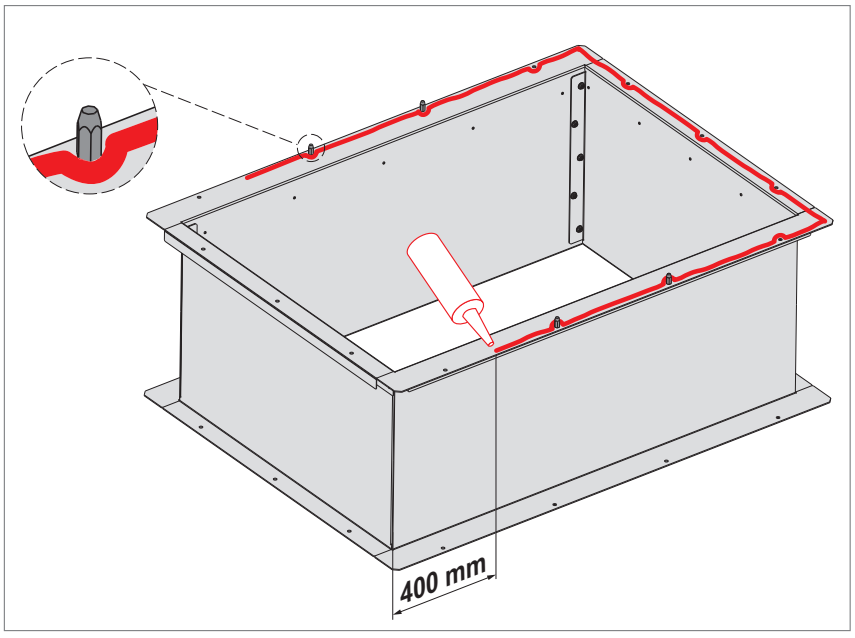


Fig. 21: Applying the sealing compound

- Screw in the transport eyes into the connection module frame and attach the lifting gear.
  – Heed the minimum length of the lifting ropes (see Fig. 22).
- Transport the below-roof unit to the roof frame using a helicopter or crane.
- Turn the below-roof unit to the correct position.
- Hang the below-roof unit into the roof frame from above.
  – The adjustment screws on the roof frame support the correct positioning.
- Check the sealing strip on the connection module flange. Improve the seal if necessary.
- Remove the transport eyes.

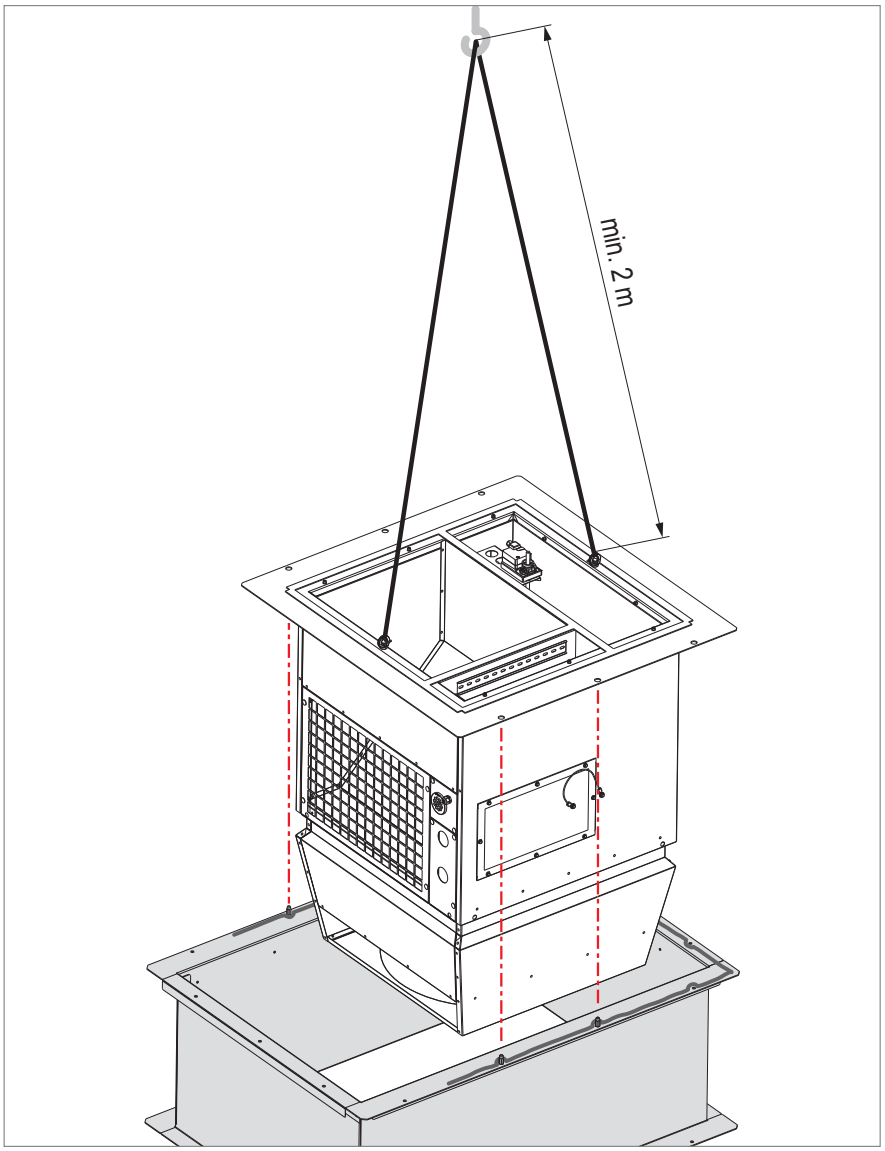


Fig. 22: Hanging the below-roof unit

Installing the roof unit

- Loosen the fixation of the lifting kit on the pallet.
- Attach the lifting gear (see Fig. 23).
  - Heed the minimum length of the lifting straps.
  - Protect the unit roof at the 4 upper corners with spacer bars that rest against the profile frame of the unit.
  - Pass the lifting straps through the lugs of the lifting kit.
- Apply sealing compound to the roof frame and to the connection module flange:
  - Apply the sealing compound evenly and in a straight line close to the outer edge (max. 20 mm distance from the edge).
  - Run the sealing bead around the inside of the holes.
- Transport the roof unit onto the roof.
- Correctly position the roof unit over the below-roof unit and set it down.
  - The isolation switch of the roof unit and the extract air grille of the below-roof unit are located on the same side.
  - The adjustment screws on the roof frame support the correct positioning.
- Screw the roof unit to the roof frame:
  - Use the supplied M8 x 30 screws and washers.
  - Torque 20 Nm
- Seal the connection between roof unit and roof frame with sealing compound.
- Remove the lifting kits:
  - Unscrew the lifting kits.
  - Keep the lifting kits for when disassembling the units at a later date at the end of their service life.
  - Remount the screws in the unit.

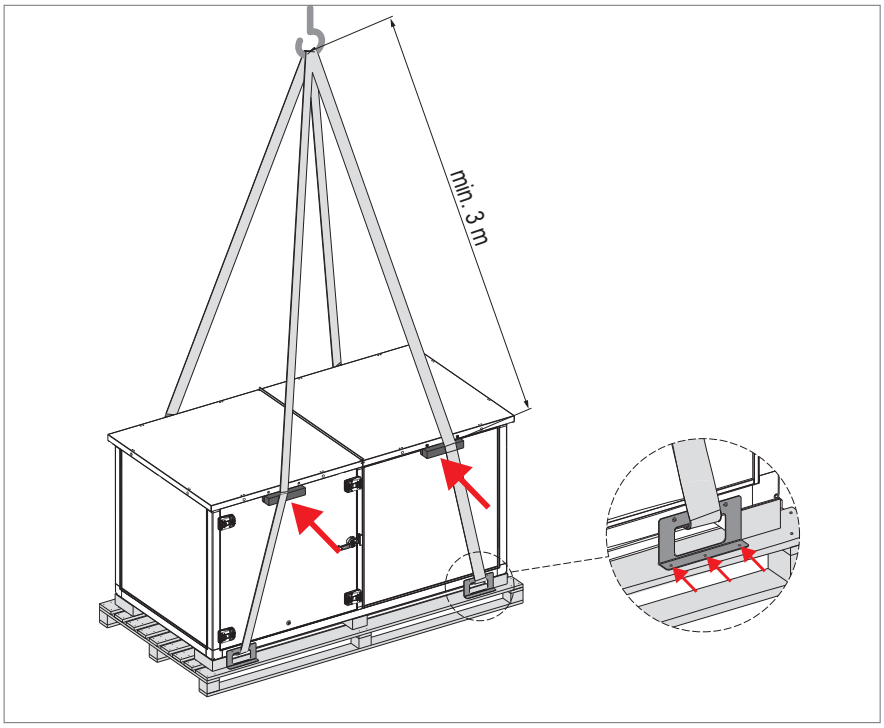
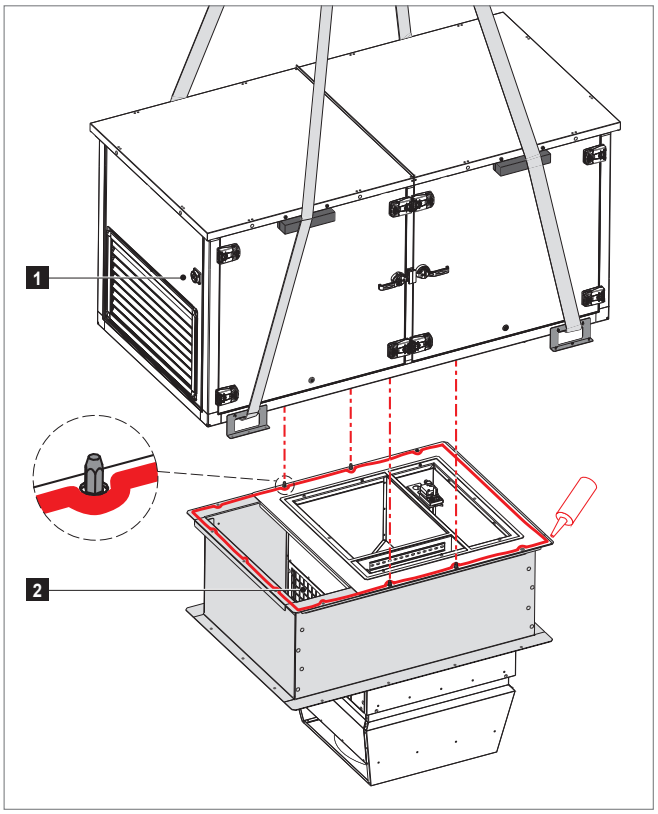
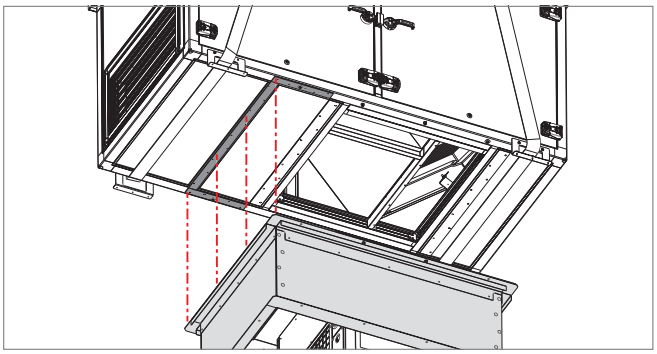


Fig. 23: Lifting the roof unit





1 Isolation switch
2 Extract air grille

Fig. 24: Applying the sealing compound and positioning on the roof frame

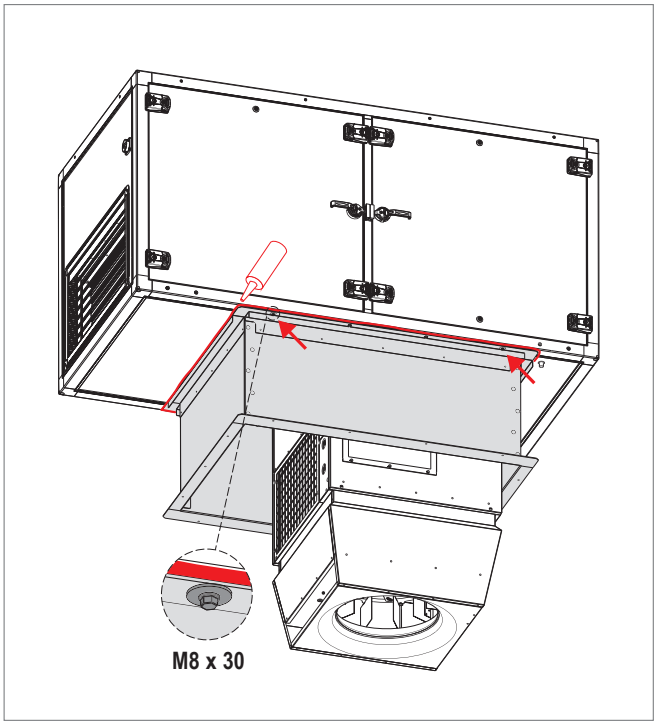


Fig. 25: Screw joint and sealing

Mounting the protection hood

The protection hood for the fresh air inlet (option) is supplied loose, consisting of 2 side plates and 2 cover plates. It must be fitted to the unit at the building site. The mounting material is provided. Proceed as follows:

- Screw the upper cover plate onto the two side plates.
  - Use the M4 x 20 countersunk screws with washers (4 x).
- Screw the assembly to the roof unit.
  - Use the 4.5 x 35 Spengler screws with washer (11 x).
- Screw on the front cover plate.
  - Use the M4 x 20 countersunk screws with washers (10 x).

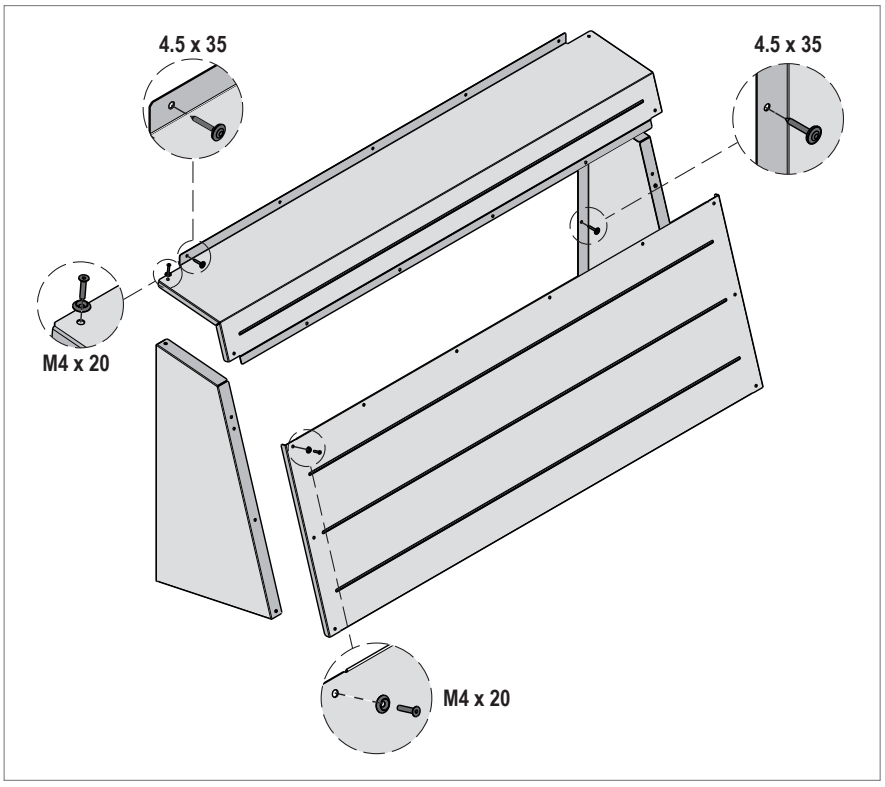


Fig. 26: Mounting the protection hood

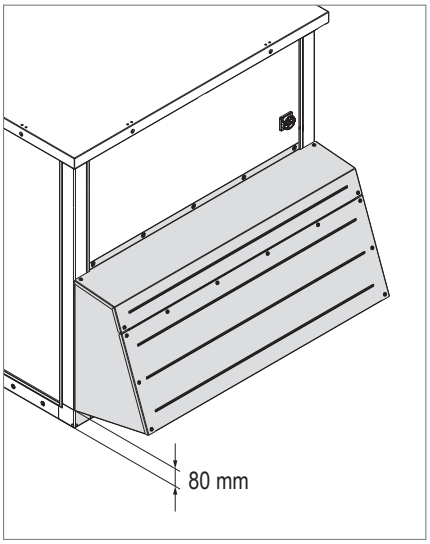


Fig. 27: Protection hood mounted on the roof unit

Mounting the cover for the connections

The cover for the refrigerant and electrical connection of the heat pump is supplied loose. The mounting material is provided.

After completing the refrigeration system and the electrical installation:

- Screw the cover for the connections to the roof unit.

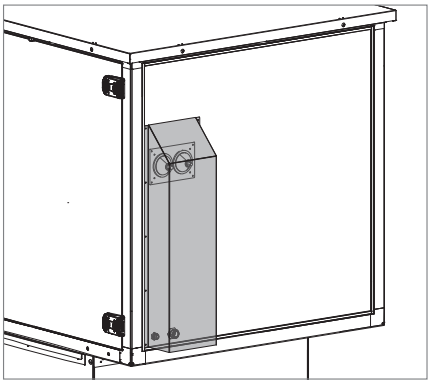


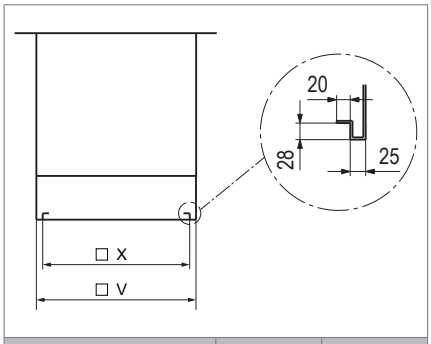
Fig. 28: Cover for the connections

7.6 Connecting air ducts

Attention
Danger of damaging the units. The unit must not be subjected to the weight of the ducts. Suspend the ducts from the ceiling or support them on the floor.

TopVent® units in the design without Air-Injector

- Connect TopVent® units in the design without Air-Injector to a on-site air duct.



Size		6	9
X	mm	850	1050
V	mm	900	1100

Table 30: Connection dimensions supply air duct (in mm)

TopVent® units with air distribution box

- Mount the collars on the air distribution box with 6 self-tapping screws each.
- Connect TopVent® units with air distribution box to a on-site air duct.

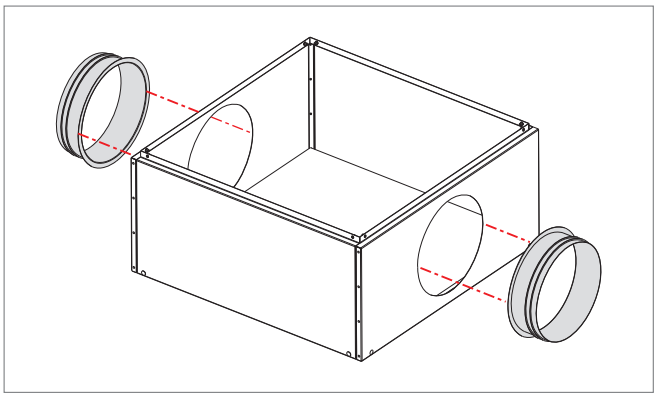


Fig. 29: Mounting the collars

7.7 Refrigeration system installation

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

To avoid damaging the unit:
- Do not use any flux.
- Ensure there is a nitrogen supply when soldering.
- Protect the unit against excessive heat with a wet cloth.
- Insulate the refrigerant pipes with appropriate care.
- Carry out a leak-tightness test and vacuum drying.

Notes on installation
- Install the refrigerant pipes as shown in Fig. 34 to Fig. 36 schematically according to the local conditions. The maximum length for the flow and the return is 40 m each.
- The material to be used and the pipe thickness depend on the pipe diameter:

Pipe diameter	Material	Pipe thickness
∅ 12.7 mm	Hardened copper	0.8 mm
∅ 15.9 mm		1.0 mm
∅ 19.1 mm		1.0 mm
∅ 28.6 mm	Semi-hard copper	1.3 mm

Table 31: Configuration of refrigerant pipes

- The thickness of the insulation depends on the pipe diameter. Minimum thicknesses are given in Table 32. Thicker insulation is required in hot, humid environments.

Pipe diameter	Minimum thickness of the insulation [1]	Material
∅ 12.7 mm	15 mm	Closed-cell foam, fire protection class B1, temperature-resistant up to 120 °C, outer insulation UV-resistant
∅ 15.9 mm	20 mm	
∅ 19.1 mm	20 mm	
∅ 28.6 mm	20 mm	

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

Table 32: Insulation of the refrigerant pipes

- Insulate the refrigerant pipes completely and without gaps.
- Insulate branch joints and weld seams only after the leak-tightness test.
- Insulate the liquid line and gas line separately.

Attention
Danger of unit damage due to condensation. Insulate the refrigerant pipes and connections with appropriate care to prevent condensation forming and dripping into the hall.

- Install the expansion valve supplied loose in the TopVent® roof unit, as shown in Fig. 30. Please note the following:
  – It is essential that the expansion valve is mounted in a vertical position.
  – The pipes of the expansion valve must not be shortened.

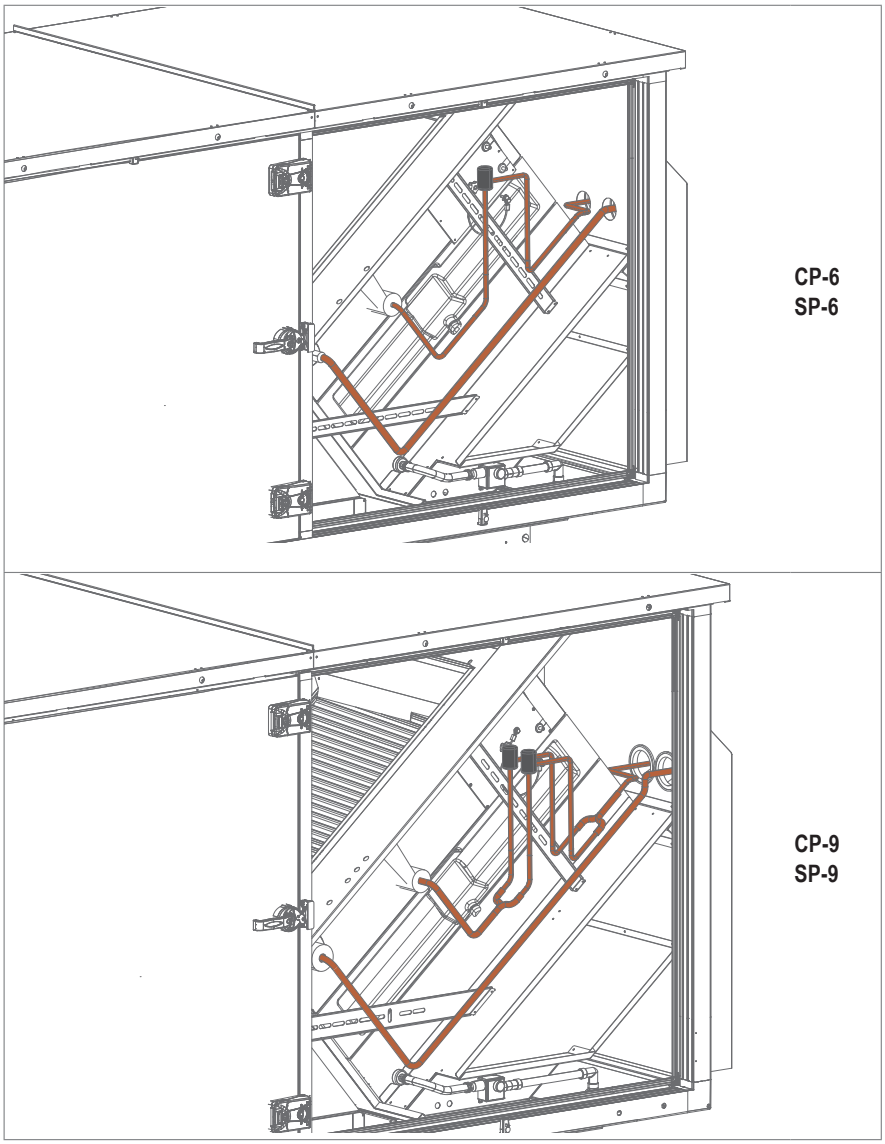


Fig. 30: Installation of refrigerant pipes in the roof unit

Notice
After completing the refrigeration system and electrical installation, screw the cover for the connections to the roof unit.

- 2 expansion valves are required for the Belaria® VRF (67). Use the branching kit supplied for branching the pipeline.
  – Install the branching kit so that the two branch pipes are in one plane.

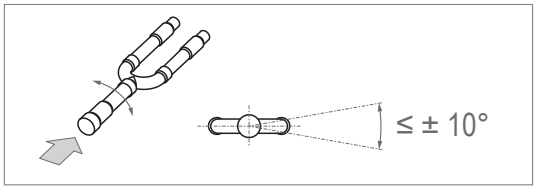


Fig. 31: Installation of the branching kit

- If the heat pump is placed more than 20 m higher than the heating/cooling coil: Install an oil return trap in the gas line every 10 m.

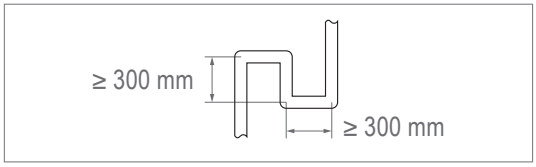
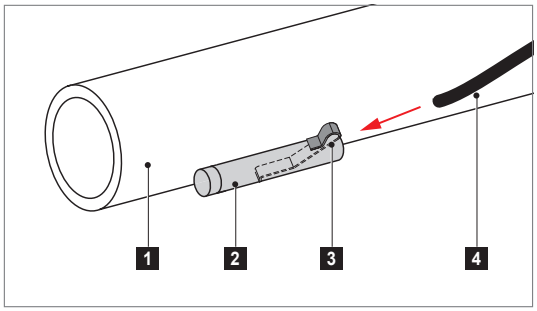


Fig. 32: Oil return trap

- Install the gas temperature sensor:
  – Solder the sleeve for the sensor to the gas line, as close as possible to the heating/cooling coil.
  – Use thermal paste to ensure a good conductivity between the sleeve and the gas line.
  – First insert the clamp and then the sensor into the sleeve.
  – Insulate the sensor and the gas line.
  – Bundle the cable up for subsequent connection to the connection box.

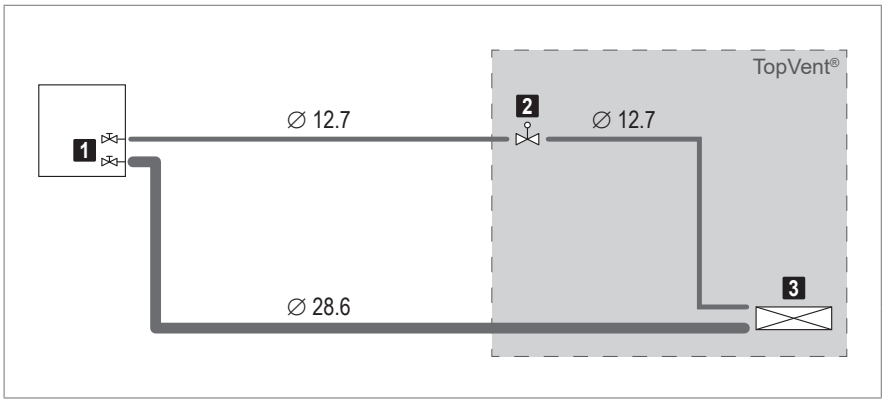


1	Gas line
2	Sleeve
3	Clamp
4	Gas temperature sensor

Fig. 33: Installing the gas temperature sensor

- Seal the refrigerant connections on the heating/cooling section:
  – Spray PU foam around the connections.
  – Apply the enclosed self-adhesive insulating mat around the connections.

Refrigerant pipes for Belaria® VRF (33)



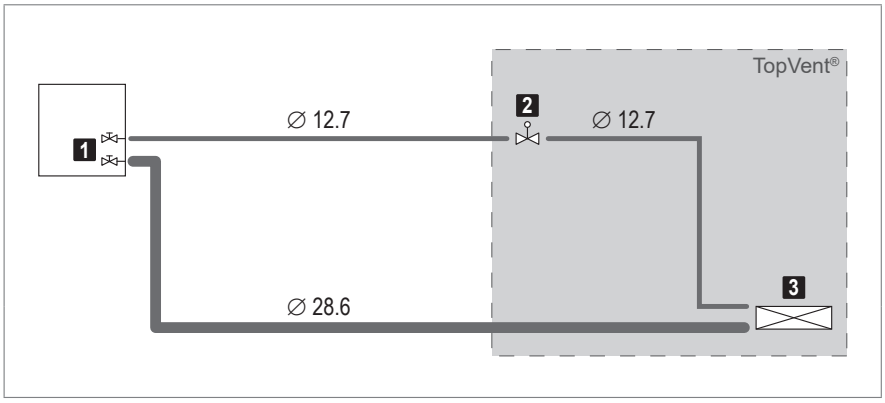
1 Connections on the heat pump
- Liquid line . . . . . ∅ 15.9 mm
- Gas line . . . . . ∅ 28.6 mm

2 Expansion valve (supplied loose for installation on-site in the TopVent® unit)

3 Heating/cooling coil

Fig. 34: Refrigerant pipes for Belaria® VRF (33) (pipe diameter in mm)

Refrigerant pipes for Belaria® VRF (40)



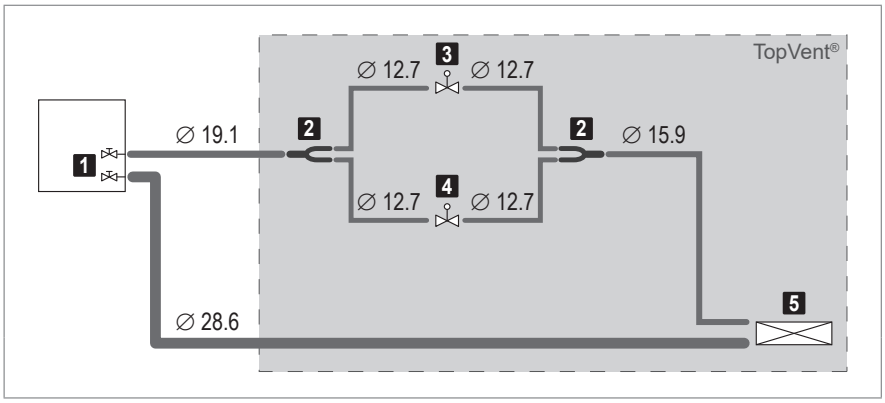
1 Connections on the heat pump
- Liquid line . . . . . ∅ 15.9 mm
- Gas line . . . . . ∅ 31.8 mm

2 Expansion valve (supplied loose for installation on-site in the TopVent® unit)

3 Heating/cooling coil

Fig. 35: Refrigerant pipes for Belaria® VRF (40) (pipe diameter in mm)

Refrigerant pipes for Belaria® VRF (67)



1 Connections on the heat pump
- Liquid line . . . . . ∅ 19.1 mm
- Gas line . . . . . ∅ 31.8 mm

2 Branching kit (supplied loose for installation on-site in the TopVent® unit)

3 Expansion valve 02 (supplied loose for installation on-site in the TopVent® unit)

4 Expansion valve 03 (supplied loose for installation on-site in the TopVent® unit)

5 Heating/cooling coil

Fig. 36: Refrigerant pipes for Belaria® VRF (67) (pipe diameter in mm)

Filling with refrigerant

- Carry out a leak-tightness test and vacuum drying before charging refrigerant.
- Calculate the additional refrigerant fill.
- Refrigerant R410A is a mixture. It is essential to add it in the liquid state. The composition can vary in the gaseous state.

Calculation of the additional refrigerant fill

- The heat pump is filled with refrigerant at the factory:
  – Refrigerant R410A

- Depending on the unit size, the heat pump is only partially prefilled at the factory, and so refrigerant must be added on site:

Belaria®		VRF (33)	VRF (40)	VRF (67)
Prefill volume	kg	11.0	11.8	11.8
Top-up volume	kg	–	1.2	10.2
Total fill volume	**kg**	**11.0**	**13.0**	**22.0**

- In addition, refrigerant must be topped up depending on the length and diameter of the liquid line (from the heat pump to the expansion valve).
  – ∅ 12.7 mm . . . 0.11 kg refrigerant per metre length
  – ∅ 19.1 mm . . . 0.26 kg refrigerant per metre length

- The entire top-up volume is calculated as follows:

	Top-up volume of heat pump		=	_____
+	____ m (∅ 12.7)	× 0.11	=	_____
+	____ m (∅ 19.1)	× 0.26	=	_____
	Total top-up volume		=	_____

7.8 Heat pump condensate connection

- 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.

7.9 Electrical installation

Caution
Danger of electric shocks. The electrical installation must only be carried out by a qualified electrician.

Please note the following:
- Observe all 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.
- Secure all connections against working loose.
- When installing cables, observe the following points:
  - Fasten the cables in place with cable mounts and cable ties or with cable conduits/ducts.
  - Use blind rivets.
  - Drill holes with a maximum diameter of 5 mm Ø.
  - The maximum drilling depth is 10 mm. Use a drill bit with a depth stop.
  - The maximum load resulting from cable holders and cable guides is 10 kg.
  - All access panels must be easily removable.
  - Do not drill any holes in the connection module around the cable duct leading to the roof unit.

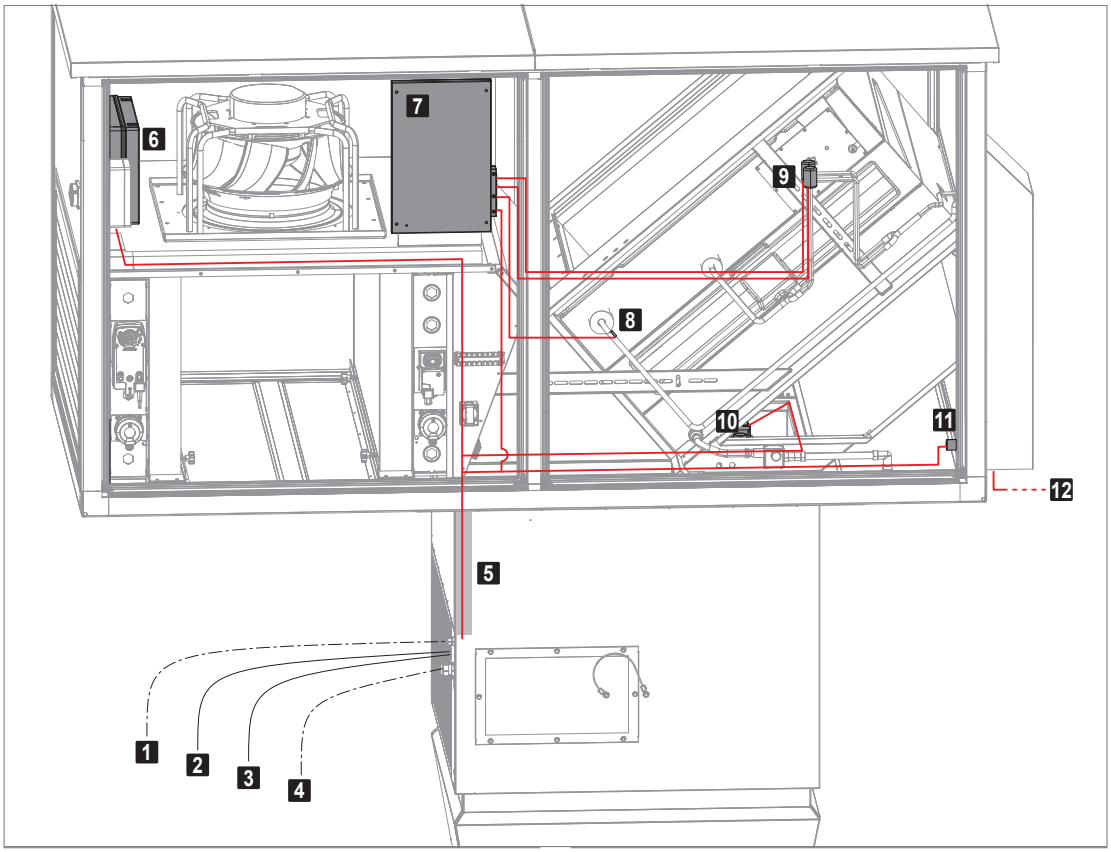
TopVent® unit
- Connect the power supply to the unit control box.
- Connect the zone bus to the unit control box.
- Connect the unit frame with the foundation earth electrode and attach an earthing label.
- Connect the Air-Injector actuator.
  - The cable from the unit control box to the actuator is pre-installed in the roof unit.
- Connect the electrical components of the heat pump system (see Fig. 38 and Fig. 39).

TopVent® options
- TopVent® SP:
  - Wire up the signal for emergency shut-off (Forced off) to the unit control box.

Temperature sensors
The room air sensor and the fresh air temperature sensor are supplied loose in the control panel:
- Install the room air temperature sensor at a representative position in the occupied area at a height of about 1.5 m. The measured values must not be distorted by the presence of sources of heat or cold (machines, direct sunlight, windows, doors, etc.).
- Install the fresh air temperature sensor at least 3 m above the ground on a north-facing wall, so that it is protected from direct sunlight. Provide cover for the sensor and thermally insulate it from the building.

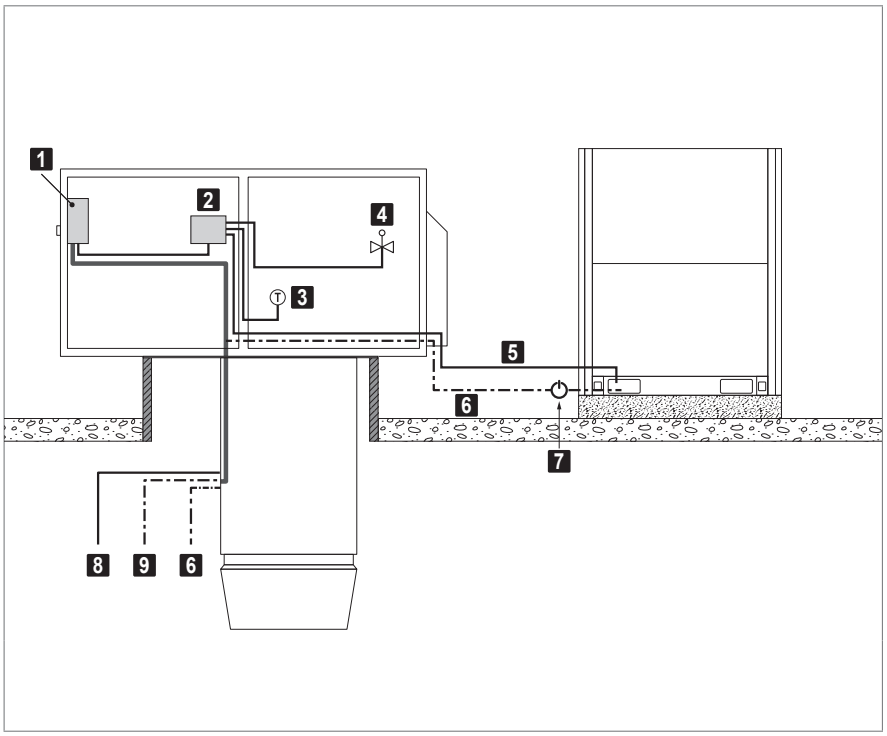
Heat pump Belaria® VRF

- Install the power supply for the heat pump:
  - Install a leakage current protective circuit for the power supply.
  - Route the cable through the TopVent® unit and secure it with cable ties.
  - Install a main switch in view of the heat pump.
  - Connect the cable for the power supply to the main switch and from there route it to the connection terminals of the heat pump.
- Install the signal line:
  - Communication TopVent® (from the conversion board to the heat pump)



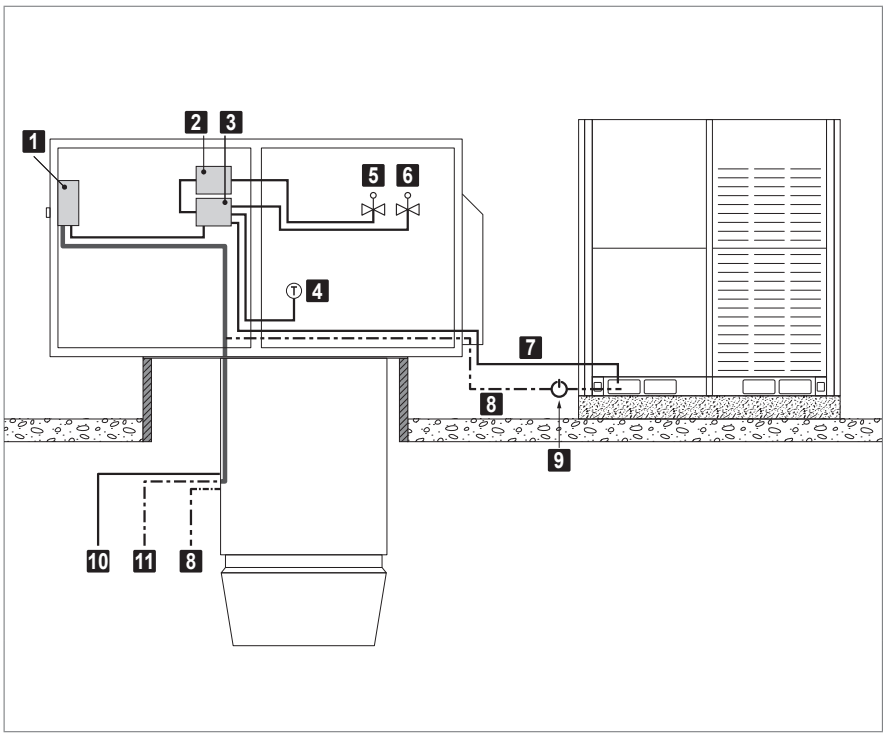
1	Power supply TopVent®	7	Conversion boards
2	Zone bus	8	Gas temperature sensor
3	Forced off (option TopVent® SP)	9	Expansion valves
4	Power supply heat pump	10	Actuator Air-Injector
5	Cable duct in the connection module	11	Cable feedthroughs
6	Unit control box	12	Heat pump

Fig. 37: On-site electrical connection



1	Unit control box
2	Conversion board
3	Gas temperature sensor (supplied loose)
4	Expansion valve (supplied loose)
5	Communication TopVent®
6	Power supply heat pump
7	Heat pump main switch (on-site)
8	Zone bus
9	Power supply TopVent®

Fig. 38: Electrical connection of the heat pump system for TopVent® CP-6, SP-6



1	Unit control box
2	Conversion board 02 – client
3	Conversion board 03 – server
4	Gas temperature sensor (supplied loose)
5	Expansion valve 02 (supplied loose)
6	Expansion valve 03 (supplied loose)
7	Communication TopVent®
8	Power supply heat pump
9	Heat pump main switch (on-site)
10	Zone bus
11	Power supply TopVent®

Fig. 39: Electrical connection of the heat pump system for TopVent® CP-9, SP-9

Notice
After completing the refrigeration system and electrical installation, screw the cover for the connections to the roof unit.

8 Operation

8.1 Initial commissioning

Attention
Risk of damage to property as a result of performing initial commissioning on your own authority. Initial commissioning must be performed by the manufacturer's customer service technicians.

Checklist to prepare for commissioning:

- Mechanical installation
  - Indoor climate units
  - Heat pump system
  - Zone control panels
  - Operator terminals
- Refrigeration system installation
  - Heat pump system (filled and documented)
- Electrical installation
  - Power supply for indoor climate units, heat pumps, zone control panels
  - Wiring of Air-Injector actuator, forced off and components of the heat pump system
  - Laying of bus cables conforming to wiring diagram
  - Installation and wiring of all sensors (room temperature sensor, fresh air sensor, ...)
  - Wiring of external operator terminals
  - Wiring of external inputs and outputs
- Organisational matters
  - Access to all system components during commissioning (indoor climate units, operator terminals, valves, ...)
  - Provision of a suitable working platform
  - Organisation of commissioning and training (date, presence of all of the respective trade groups and of the operating personnel)

The unit is checked at the factory and preset according to the specifications on the type label.

8.2 Operation

The system runs fully automatically depending on the programmed operating times and temperature conditions.

- Observe the operating instructions for the control system.
- Check alarm displays daily.
- Correct changes to operating times in the programming accordingly.
- Ensure free air outlet and unhindered dispersion of the supply air.

Information on the operating behaviour of the Belaria heat pump

Start-up at low room temperatures

At room temperatures between 5 °C and 12 °C	Time-delayed switching on of the fans of the ventilation unit because the heating/cooling coil is preheated first (duration approx. 5 to 10 min).
At room temperatures below 5 °C	No start of the heat pump possible. No commissioning possible.

Restart lock in fresh air operation

If the control system switches off the heat pump because no heat or cold is required (operating mode VE|VEL|AQ|SA)	Restart lock of the heat pump for 7 min The restart lock prevents the heat pump from short cycling, thus extending the compressor's service life.

Very low fresh air temperatures

Fresh air temperature below -25 °C	Forced stop of the heat pump because the application limit has been reached. The ventilation unit switches to L_REC.

Oil return

After 140 min operating time and then every 8 hours	The heat pump switches to cooling mode for oil return and signals a fault. The ventilation unit switches off. After completion of the oil return, the system switches back to the normal operating mode.

Restart lock after power failure

Power failure at fresh air temperatures below 4 °C	Restart lock of the heat pump to prevent cold start of a compressor. The ventilation unit switches to L_REC. The duration of the lock depends on the duration of the power failure and the fresh air temperature:	
	Power failure	**Restart lock (at 4…-25°C fresh air temperature)**
	5…30 min	10…120 min
	> 30 min	60…480 min

9 Maintenance and repair

Caution
Risk of injury from incorrect work. Maintenance work must be carried out by trained personnel.

9.1 Safety

Before performing any work on the unit:

- Turn the isolation switch on the unit to the 'Off' position and secure it against being switched back on.

  Caution
  Danger of electric shocks. The unit controller and the service socket are still live.

- Wait at least 3 minutes after switching the unit off.

  Caution
  The use of condensers can pose a danger of fatal injury from directly touching live parts even after the unit is switched off. Only open the access doors after waiting 3 minutes.

  Caution
  Crushing hazard – the fresh air damper has a spring return actuator and closes automatically. Do not reach into the open damper.

- Observe the accident prevention regulations.
- Observe the particular dangers involved when working on electrical systems.
- When working in the unit, take precautions against unprotected, sharp metal edges.
- Immediately replace damaged or removed informational and warning signs.
- Following maintenance work, professionally reassemble all dismantled protective devices.
- Replacement parts must comply with the technical requirements of the unit manufacturer. Hoval recommends the use of original spare parts.

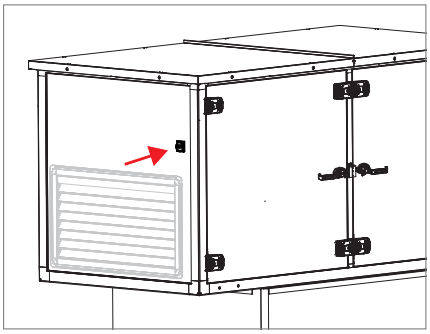


Fig. 40: Position of the isolation switch

Notice
The main switch for the heat pump is installed on site.

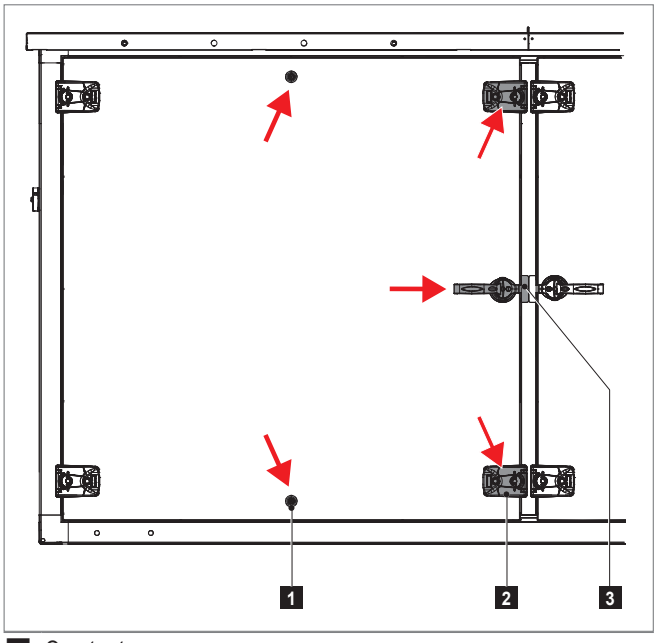
9.2 Opening and closing access doors

Opening

- Unlock the quarter turns at the top and bottom with the supplied keys.
- Unlock the latch hinges with the supplied keys.
- Fold up the latches and turn them by 90°.
- Open the access door with the door handle until the door holder engages.
  – The door holder holds the door in position at an opening angle of 90°.

Closing

- Check the earth cable and fix it again if necessary.
- Push up the locking pin to unlock the door holder.
- Close the access door with the door handle.
- Turn the latches by 90°, fold them down and press on until the lock engages.
- Lock the quarter turns at the top and bottom.



1 Quarter turn
2 Latch hinge
3 Door handle

Fig. 41: Access door

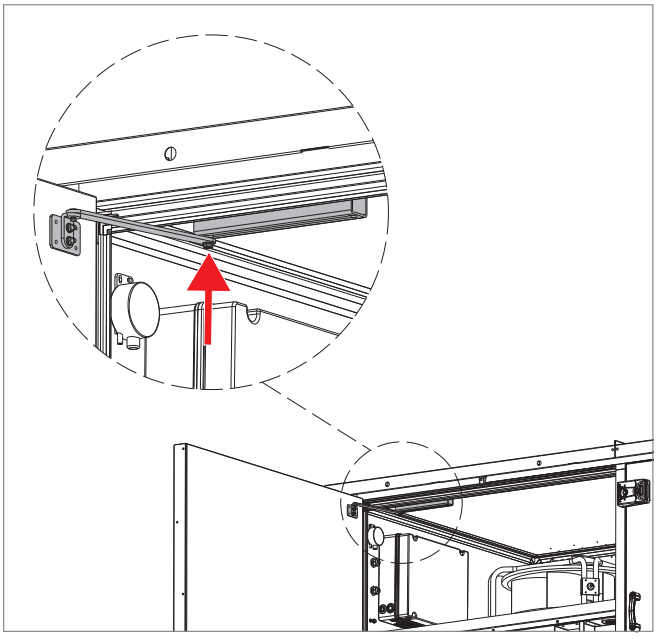


Fig. 42: Unlocking the door holder

9.3 Maintenance

Maintenance schedule

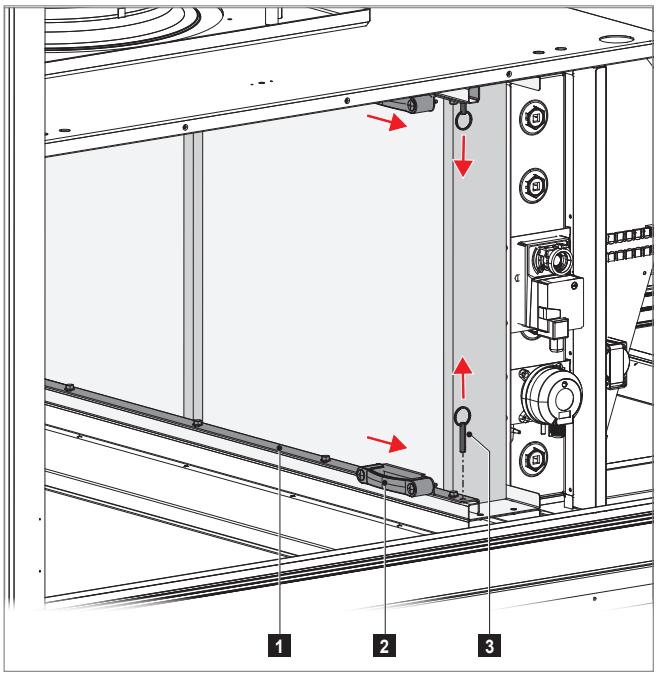
<table>
<tr><th>Activity</th><th>Procedure</th><th>Interval</th></tr>
<tr><td>Clean unit</td><td>■ Clean the TopVent® unit and the Belaria® VRF heat pump.
■ Remove the siphon, clean it and rinse the condensate drain.</td><td>1 × annually</td></tr>
<tr><td>Functional check</td><td>■ Check function of the fan.
■ Check fan motor for bearing damage.
■ Check function of the actuators.
■ Check function of the Air-Injector.
■ Check function of the heat pump.
■ Check function of the control system.</td><td>1 × annually</td></tr>
<tr><td>Changing the filter</td><td>■ Renew air filter.
<table><tr><th>Fresh air / Extract air</th><th>Filter class</th><th>Mat. no.</th></tr><tr><td>Size 6</td><td>ISO ePM_1 55 %</td><td>2083604</td></tr><tr><td>Size 9</td><td>ISO ePM_1 55 %</td><td>2083634</td></tr></table></td><td>When the filter alarm is displayed, at least 1× annually</td></tr>
</table>

Table 33: Maintenance schedule

Changing the filter

Caution
Danger of hazardous emissions from damaged filters:
– Only hold the filters on the black filter frame.
– Never touch the white filter medium.
– Replace damaged filter elements immediately.

- Changing the air filter (fresh air/extract air):
  – Open the fan access door.
  – Pull the locking pins out of the clamping rails.
  – Pull the clamping rails forwards by the handles.
  – Remove the filters.
  – Insert the new filters.
  – Bring the clamping rails back into position.
  – Re-insert the locking pins.
  – Close the fan access door.
- Dispose of the filters in accordance with local regulations.
  – The disposal of used filters depends on the contents.



1 Clamping profile
2 Handle
3 Locking pin

Fig. 43: Changing the filter

9.4 Repair

If required, contact Hoval customer service.

Product service life

Component	Service life
EC motor of the fan	up to 40'000 hours depending on the application and environmental conditions
Damper actuators with spring return	at least 60'000 emergency positions

Table 34: Product service life

10 Dismantling

Caution
Risk of injury caused by falling load and improper handling.
– Wear protective equipment (fall protection, helmet, safety shoes).
– Do not stand under suspended loads.
– Use cranes or helicopters with sufficient load-bearing capacity.
– Do not lift the two-part unit in one piece.

- Disconnect the power supply to the unit.
- Wait at least 3 minutes after switching the unit off.

Caution
The use of condensers can pose a danger of fatal injury from directly touching live parts even after the unit is switched off. Only open the unit after waiting 3 minutes.

- Drain the refrigerant circuit.
- Dismantle all media connections.
- Disconnect the unit from any fastenings.
- Disconnect the screw connection between the roof unit and below-roof unit.
- Screw the lifting kits to the roof unit and attach the lifting gear.
- Remove the roof unit.
- Screw in the transport eyes into the connection module frame and attach the lifting gear.
- Remove the below-roof unit.

11 Disposal

- Recycle metal components.
- Recycle plastic parts.
- Dispose of electric and electronic parts via hazardous waste.
- Dispose of oil-fouled parts in accordance with local regulations.
- Dispose of the filters in accordance with local regulations.
  – The filters are fully incinerable; the disposal of used filters depends on the contents.

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