












Hoval TopVent®

CH | CC | CHC | SH | SC | SHC

Design handbook

Recirculation units and supply air units configured as roof units with efficient air distribution for heating and cooling with central heat and cold generation



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Hoval Indoor Climate Systems

Efficient. Flexible. Reliable.

A



Efficient. Flexible. Reliable.

Hoval indoor climate systems are decentralised systems for heating, cooling and ventilating halls for industrial, commercial and leisure applications. The systems have a modular structure. One system comprises several ventilation units which are spread around the room. These units are equipped with reversible heat pumps and gas-fired appliances for decentralised heat and cold generation, or they heat and cool with a connection to a central energy supply. Tailored control systems complete the system and ensure the effective combination and optimal use of all resources.

Diverse range of units ensures flexibility

Different types of ventilation units can be combined to create the perfect system for the project in question:

- RoofVent® supply and extract air handling units
- TopVent® supply air units
- TopVent® recirculation units

The number of supply and extract air handling units depends on how much fresh air is required in order to create a comfortable atmosphere for people in the building. Recirculation units cover additional heat or cool demand as required. A broad range of unit types and sizes with heating and cooling coils in various output levels means that the overall output of the system can be scaled to whatever level is required.

Specially designed unit versions are also available for halls with particularly humid or oily extract air.

Furthermore, there is a range of units available which have been expressly developed for very specific purposes. ProcessVent units, for example, are coupled with extract air purification systems in industrial halls and recover heat from process air.

Draught-free air distribution

A key feature of Hoval indoor climate units is the patented vortex air distributor, known as the Air-Injector. It is controlled automatically and changes the blowing angle of the air continuously between vertical and horizontal. The highly efficient air supply system has many advantages:

- It provides a high level of comfort during heating and cooling. No draughts develop in the hall.
- The efficient and even air distribution ensures that the indoor climate units cover a large area.
- The Air-Injector keeps the temperature stratification in the room low, thus minimising heat loss through the roof.

Control with specialist expertise

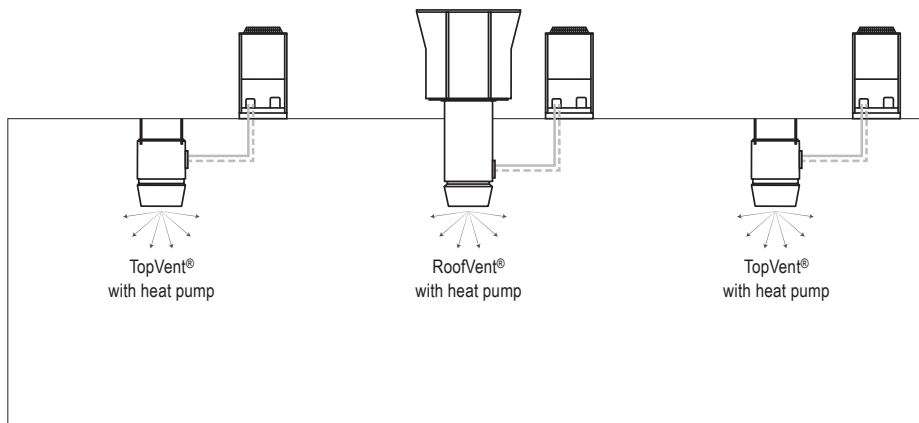
The TopTronic® C control system, which was specifically developed for Hoval indoor climate systems, regulates the separate units individually and controls them based on zones. This enables optimal adjustment to the local requirements of the different usage areas in the building. The patented control algorithm optimises energy use and ensures maximum comfort and hygiene levels. Clear interfaces make it easy to connect the system to the building management system.

Simpler control systems are also available for units that are only used for supply air or air recirculation.

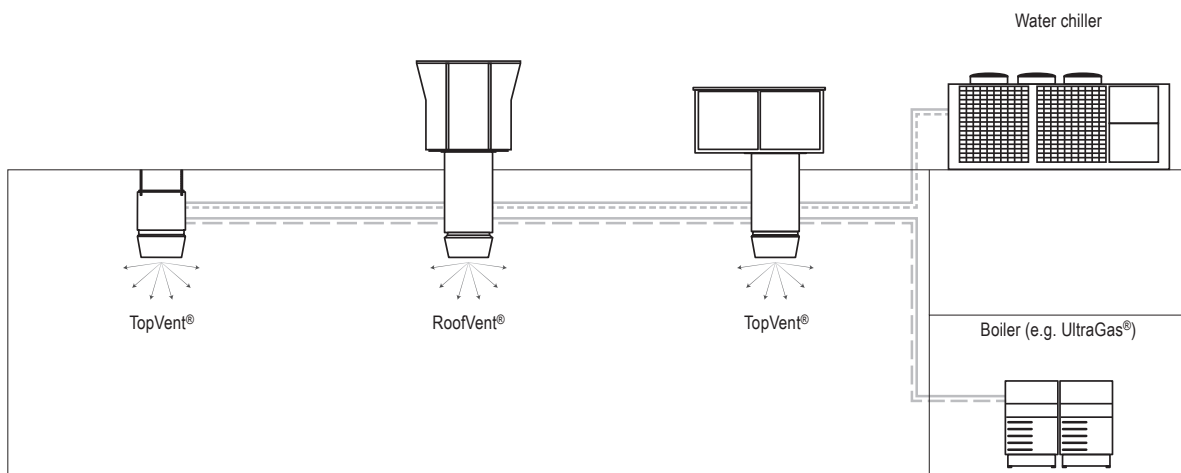
Competent and reliable

Hoval will support you and provide expert knowledge throughout all project phases. You can rely on comprehensive technical advice when it comes to planning Hoval indoor climate systems and on the skills of the Hoval technicians during the installation, commissioning and maintenance of the system.

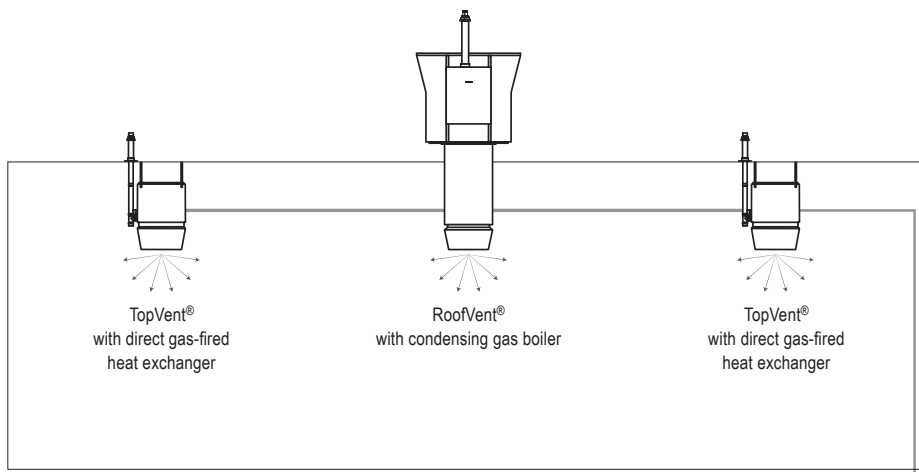
System with decentralised heat and cold generation with heat pump



System with central heat and cold generation



System with decentralised, gas-fired heat generation





TopVent® CH

Recirculation unit configured as roof unit for heating spaces up to 25 m in height with central heat supply

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B

1 Use

1.1 Intended use

TopVent® CH is a recirculation unit for heating spaces up to 25 m in height with central heat supply. It fulfils the following functions:

- Heating (with connection to a hot water supply)
- Recirculation operation
- Air distribution and destratification with adjustable Air-Injector
- Air filtration

TopVent® CH is configured as a roof unit. It is installed in the roof to save space and does not protrude far into the room. Maintenance work is carried out from the roof without causing disruption to operations in the building.

TopVent® CH units comply with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of energy-related products. They are systems of the 'fan coil unit' type, provided for in Commission Regulation (EU) 2016/2281.

The Hoval TopTronic® C integrated control system ensures energy-efficient, demand-based operation of Hoval indoor climate systems.

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

1.2 User group

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

2 Construction and operation

2.1 Construction

The TopVent® CH unit consists of the following components:

Roof unit

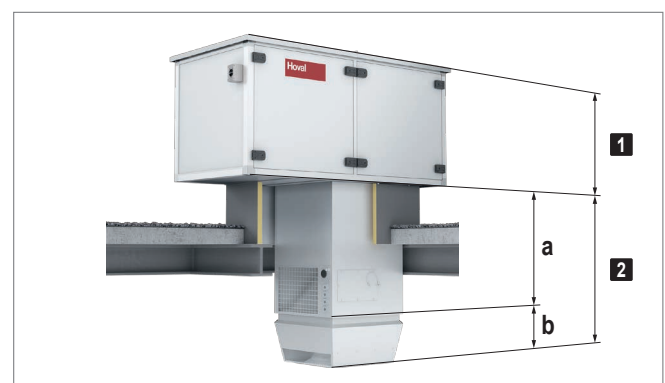
The self-supporting housing for mounting on the roof frame is of double-shell construction; this ensures good thermal insulation and high stability. The roof unit includes the following components:

- Fan
 - Heating section
 - Coil for heating the supply air with hot water
 - Extract air filter
 - Unit control box (part of the TopTronic® C control system)
- All components are easily accessible for maintenance work through large access openings.

Below-roof unit

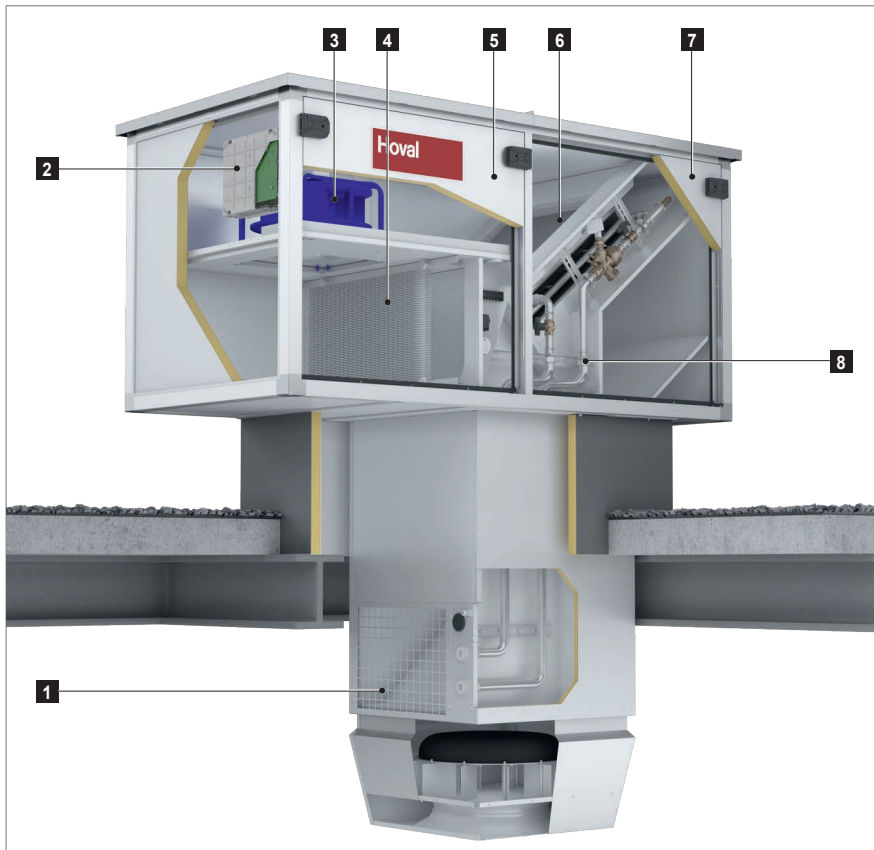
The below-roof unit comprises the following components:

- 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 3 lengths.
- 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.



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

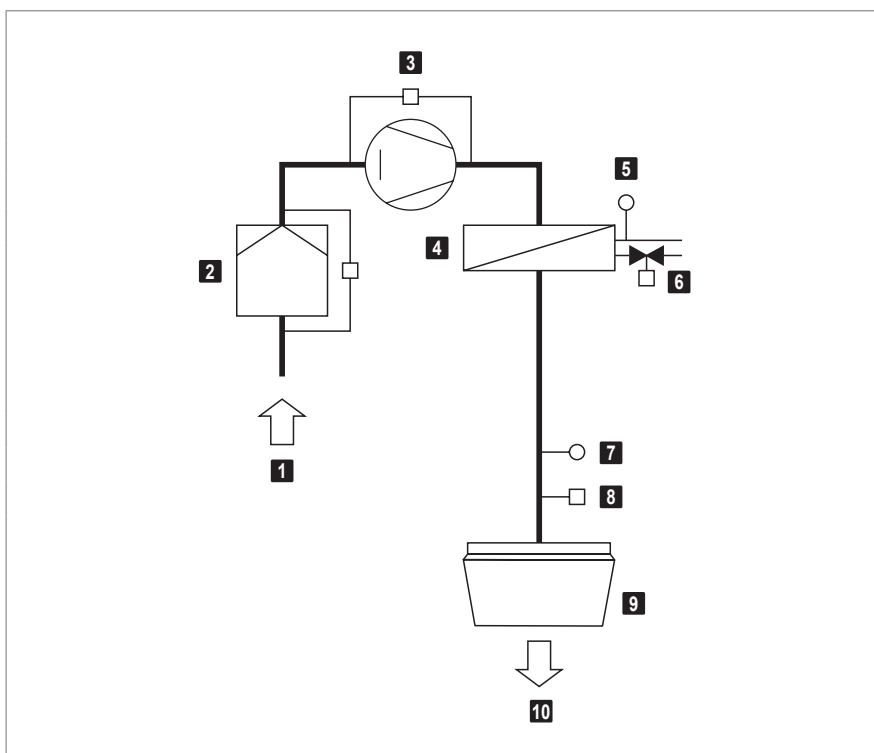
Fig. B1: TopVent® CH components



- 1 Extract air grille
- 2 Unit control box
- 3 Fan
- 4 Extract air filter
- 5 Fan access door
- 6 Heating coil
- 7 Hydraulic connection access door
- 8 Hydraulic assembly throttling circuit

Fig. B2: TopVent® CH construction

2.2 Function diagram



- 1 Extract air
- 2 Extract air filter with differential pressure switch
- 3 Fan with flow rate monitoring
- 4 Heating coil
- 5 Return temperature sensor
- 6 Control valve with actuator (option)
- 7 Supply air temperature sensor
- 8 Actuator Air-Injector
- 9 Air-Injector
- 10 Supply air

Fig. B3: TopVent® CH function diagram

2.3 Operating modes

TopVent® CH operates in the following modes:

- Recirculation
- Recirculation speed 1
- Standby

The TopTronic® C control system regulates these operating modes automatically for each control zone in accordance with the specifications in the calendar. The following points also apply:

- The operating mode of a control zone can be switched over manually.
- Each TopVent® CH unit can operate individually in a local operating mode: Off, Recirculation, Recirculation speed 1.

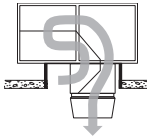
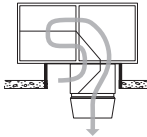
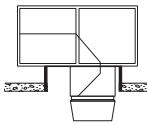
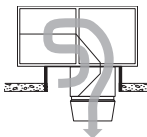
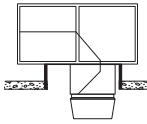
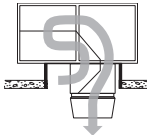
Code	Operating mode		Description
REC	Recirculation On/off-operation: If heating is required, the unit draws in room air, heats it and blows it back into the room. The room temperature set value day is active.		Fan speed 1/2 ¹⁾ Heating on ¹⁾ 1) Depending on heat demand
DES	■ Destratification: To avoid 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).		Fan speed 2 Heating off
REC1	Recirculation speed 1 The same as REC, but the unit operates only at speed 1 (low air flow rate)		Fan speed 1 Heating on ¹⁾ 1) Depending on heat demand
DES	■ Destratification: The same as for REC, but the unit operates only at speed 1		Fan speed 1 Heating off
ST	Standby The unit is ready for operation. The following operating modes are activated if required:		
CPR	■ Cooling protection: If the room temperature drops below the set value for cooling protection, the unit heats up the room in recirculation operation.		Fan speed 2 Heating on
L_OFF	Off (local operating mode) The unit is switched off. Frost protection for the unit remains active.		Fan off Heating off
-	Forced heating The unit draws in room air, warms it and blows it back into the room. Forced heating is activated by connecting the unit to a power supply (only if there is no bus connection to the zone controller). For example, it is suitable for heating the hall before taking the control system into operation or if the controller fails during the heating period.		Fan speed 2 Heating on

Table B1: TopVent® CH operating modes

3 Technical data

3.1 Type code

CH - 6 B - ...	
Unit type	TopVent® CH
Unit size	6 or 9
Heating section	A with coil type A B with coil type B C with coil type C
Further options	

Table B2: TopVent® CH type code

3.2 Application limits

Extract air temperature	max.	°C	45
Moisture content of extract air	max.	g/kg	15
Supply air temperature	max.	°C	60
Temperature of the heating medium	max.	°C	90
Pressure of the heating medium	max.	kPa	800
Air flow rate	Size 6:	min.	m³/h 3100
	Size 9:	min.	m³/h 5000

The units cannot be used in:

- Damp locations
- Places with a corrosive or aggressive environment
- Spaces with a large amount of dust
- Areas where there is danger of explosion

Table B3: TopVent® CH application limits

3.3 Electrical connection

Unit type		CH-6	CH-9
Supply voltage	V AC	3 x 400	3 x 400
Permitted voltage tolerance	%	± 5	± 5
Frequency	Hz	50	50
Connected load	kW	2.23	3.33
Current consumption max.	A	4.17	5.87
Series fuse	A	13	13
Protection rating	-	IP 54	IP 54

Table B4: TopVent® CH electrical connections

3.4 Air flow rate

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

Table B5: TopVent® CH air flow rate

3.5 Air filtration

Filter	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 B6: TopVent® CH air filtration

3.6 Sound level

Unit type		CH-6C		CH-9C		
		indoors	outdoors	indoors	outdoors	
Sound pressure level (at a dist. of 5 m) ¹⁾	dB(A)	55	42	58	45	
Total sound power level	dB(A)	77	64	80	67	
Octave sound power level	63 Hz	dB	45	40	46	41
	125 Hz	dB	61	55	64	58
	250 Hz	dB	67	57	69	59
	500 Hz	dB	71	60	73	62
	1000 Hz	dB	74	57	77	60
	2000 Hz	dB	70	56	75	61
	4000 Hz	dB	66	47	71	52
8000 Hz	dB	65	39	65	39	

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

Table B7: TopVent® CH sound level

3.7 Heat output

Heating medium temperature			80/60 °C					60/40 °C				
Size	Type	t _{room} °C	Q kW	H _{max} m	t _s °C	Δp _w kPa	m _w l/h	Q kW	H _{max} m	t _s °C	Δp _w kPa	m _w l/h
CH-6	A	16	32.8	13.4	34.2	7	1410	18.8	16.8	27.3	2	807
		20	30.3	14.0	37.0	6	1301	16.2	17.9	30.0	2	697
	B	16	47.0	11.6	41.3	13	2020	26.9	14.6	31.3	4	1157
		20	43.4	12.0	43.5	11	1864	23.3	15.5	33.5	3	1001
	C	16	76.0	9.4	55.6	18	3267	45.0	11.8	40.3	6	1935
		20	70.3	9.8	56.8	16	3022	39.3	12.5	41.5	5	1690
CH-9	A	16	55.5	13.6	36.6	8	2386	31.7	17.0	28.5	3	1364
		20	51.2	14.1	38.9	7	2201	27.4	18.1	31.1	2	1179
	B	16	71.2	12.2	41.5	12	3060	40.6	15.4	31.4	4	1746
		20	65.7	12.7	43.7	10	2823	35.1	16.5	33.6	3	1509
	C	16	117.9	9.8	56.9	18	5066	69.9	12.3	41.1	6	3003
		20	109.1	10.2	58.0	15	4686	61.0	13.1	42.1	5	2622
Legend:	Type = Type of coil		t _s = Supply air temperature		t _{room} = Room air temperature		Δp _w = Water pressure drop		Q = Heat output		m _w = Water quantity	
Reference:	■ At room air temperature 16 °C: extract air temperature 18 °C		■ At room air temperature 20 °C: extract air temperature 22 °C									

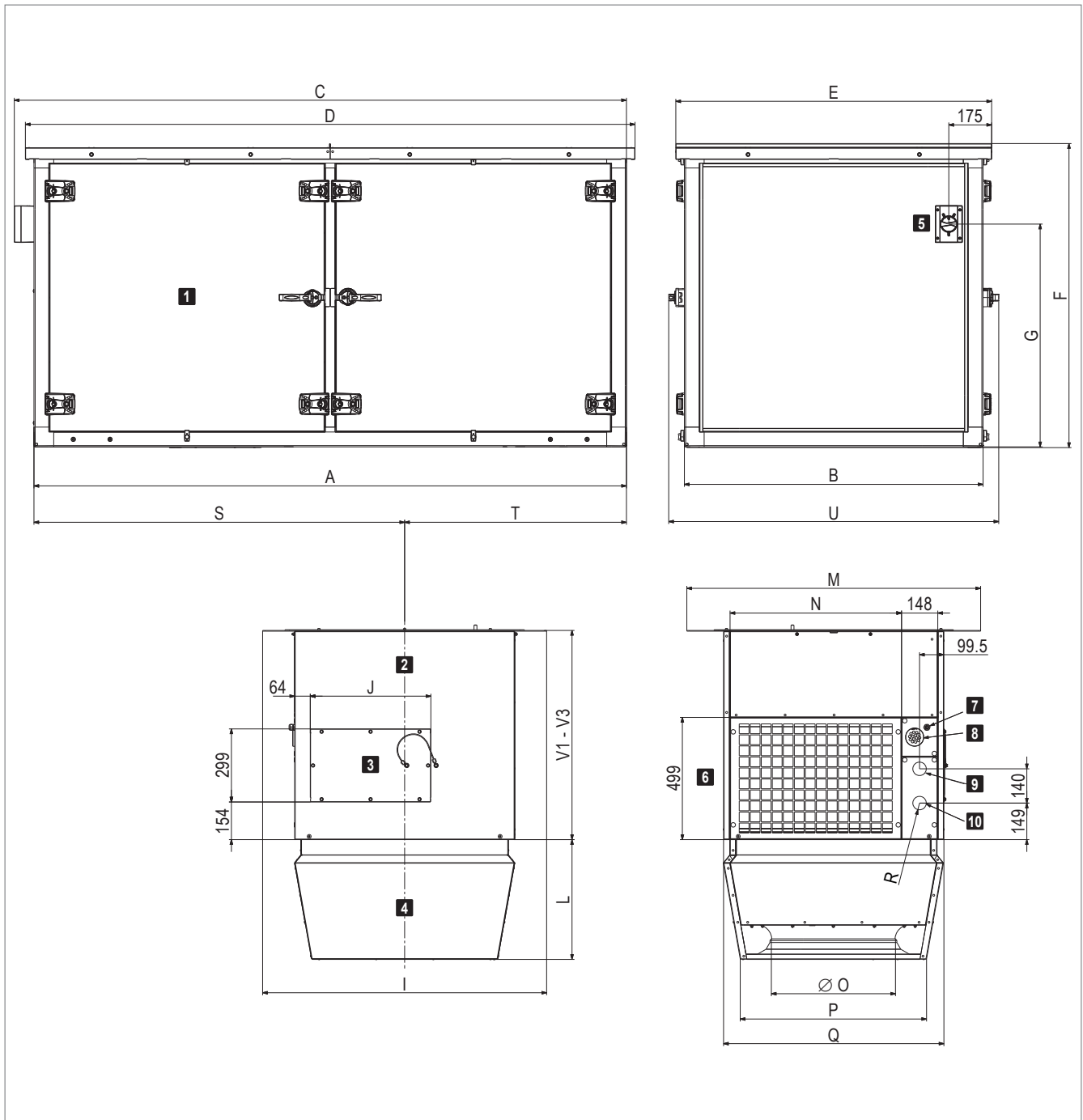
Table B8: TopVent® CH heat output

3.8 Product information according to ErP

Trademark / Model	Hoval TopVent® CH						Unit
	6 A	6B	6C	9 A	9B	9C	
Cooling capacity (sensible) ($P_{rated,c}$)	–	–	–	–	–	–	kW
Cooling capacity (latent) ($P_{rated,c}$)	–	–	–	–	–	–	kW
Heating capacity ($P_{rated,h}$)	13.2	18.9	29.8	22.6	28.5	46.2	kW
Total electric power input (P_{elec})	0.88	0.91	0.99	1.57	1.64	1.77	kW
Sound power level (L_{WA})	64			67			dB(A)
Contact details	Hoval Aktiengesellschaft Austrasse 70, 9490 Vaduz, Liechtenstein www.hoval.com						

Table B9: Product information according to Commission Regulation (EU) 2016/2281, Table 13

3.9 Dimensions and weights



- | | |
|----------------------------|--|
| 1 Roof unit | 6 Extract air grille |
| 2 Connection module | 7 Cable gland for power supply |
| 3 Installation lid | 8 Cable feedthrough for signal cables |
| 4 Air-Injector | 9 Heating circuit return |
| 5 Isolation switch | 10 Heating circuit flow |

Table B10: Dimensional drawing for TopVent® CH with hydraulic assembly throttling circuit (dimensions in mm)

Unit type		CH-6	CH-9
A	mm	2420	2725
B	mm	1220	1420
C	mm	2500	2805
D	mm	2490	2795
E	mm	1290	1490
F	mm	1239	1439
G	mm	910	1010
I	mm	1160	1360
J	mm	492	492
L	mm	490	570
M	mm	1200	1400
N	mm	701	901
Ø O	mm	500	630
P	mm	767	937
Q	mm	900	1100
R (internal thread) ¹⁾	"	G 1½	G 1½
S	mm	1514	1684
T	mm	906	1041
U	mm	1348	1548
V1	mm	850	850
V2	mm	1300	1300
V3	mm	1750	1750

¹⁾ TopVent® units without hydraulic assembly: pipe outlets Ø 55 mm

Table B11: TopVent® CH dimensions

Unit type	CH-	6 A	6B	6C	9 A	9B	9C
Total	kg	610	609	616	779	778	791
Roof unit	kg	468	467	474	597	596	609
Below-roof unit	kg	142	142	142	182	182	182
Air-Injector	kg	40	40	40	57	57	57
Connection module V1	kg	102			125		
Additional weight V2	kg	+ 42			+ 50		
Additional weight V3	kg	+ 85			+ 101		

Table B12: TopVent® CH weights

Heating section		6 A	6B	6C	9 A	9B	9C
Connection (internal thread)	"	Rp 1¼	Rp 1¼	Rp 1¼	Rp 1½	Rp 1½	Rp 1½
Water content of the coil	l	4.6	4.6	7.9	7.4	7.4	12.4

Table B13: Hydraulic connection of the heating section in the roof unit (without hydraulic assembly throttling circuit)

4 Specification texts

4.1 TopVent® CH

Recirculation unit for heating rooms up to 25 m in height with central heat supply; configured as roof unit; equipped with highly efficient air distributor; maximum floor area reached per unit 537 m² (size 6) and 946 m² respectively (size 9). The unit consists of the following components:

- Roof unit (with access to all components relevant for maintenance)
- Below-roof unit, consisting of:
 - Connection module
 - Air-Injector
- Optional components

TopVent® CH units comply with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of energy-related products. They are systems of the 'fan coil unit' type, provided for in Commission Regulation (EU) 2016/2281.

Roof unit

Self-supporting casing, construction made of thermally decoupled aluminium profile frame system with nylon connecting elements and panels made of magnesium-zinc sheet, additional rain canopy made of aluminium:

- 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 includes:

Fan

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

Heating section

The heating section contains:

- The highly efficient heating coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the hot water supply

Extract air filter

Pleated cell filter of filter class ePM₁ 55% according to ISO 16890, consisting of micro glass with synthetic lamination as handle protection, pleat pack completely encapsulated to prevent leakage, frame made of recycled plastic, fully incinerable, including differential pressure switch for filter monitoring.

Unit control box

Control box for connection of the power supply and housing the control components that facilitate energy-optimised operation, controlled by the control system TopTronic® C. Plastic casing, protection rating IP 56. The following components are installed:

- Circuit board with all required electrical components, unit controller (clipped on) as well as connection terminals for all internal and the following external connections:
 - Heating valve
 - Heating pump
 - Door contact

The circuit board is fitted with push-in terminals facilitating easy installation of the connection cables. All components in the unit control box as well as sensors, actuators in the unit and the isolation switch attached to the outside of the unit are fully factory-wired.

Power supply, bus connection, connection to Air-Injector actuator to be installed on site

Terminal box (variant)

Terminal box fitted at the side of the housing for connection of the power supply and peripheral components of the unit. Plastic casing, protection rating IP 56. The following components are installed:

- Circuit board with all required electrical components as well as connection terminals for the following signals:
 - Input Enable fan
 - Input Control signal fan
 - Output Control signal next fan
 - Input Control signal actuator Air-Injector
 - Output Control signal next actuator Air-Injector
 - Output Feedback control signal Air-Injector
 - Output Error
- The following components in the unit are factory-wired:
 - Isolation switch
 - Fan
 - Supply air temperature sensor

Access openings

Defined side walls of the roof unit configured as inspection doors for easy access to all components relevant for maintenance. The hinges allow opening with an opening angle of 90° or complete removal of the inspection doors.

Below-roof unit

Connection module V1

Housing made of magnesium zinc sheet, air-tight, flame retardant, with highly efficient insulation made of expanded polystyrene, hygienic and easy to maintain because of smooth interior surfaces and ageing-resistant, silicone-free sealing materials; configured with:

- Extract air grille
- Cable feedthroughs for the electric supply
- Pipe feedthroughs for the hydraulic supply

Installation and insulation of the pipelines on site

Connection module V2 / V3 (variant)

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

Design with Air-Injector

Housing made of magnesium zinc sheet, air-tight, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, 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

Actuator installed in the connection module for easy access from the roof.

Design without Air-Injector (variant)

Unit configured without vortex air distributor for connection to an on-site supply air duct and air distribution within the building.

Air distribution box (variant)

Housing made of magnesium zinc sheet, air-tight, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, configured with 2 collars as connecting piece to the on-site air distribution system.

Outlet nozzle (variant)

Housing made of magnesium zinc sheet, air-tight, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials. Concentric outlet nozzle.

Options for the unit

Coating of roof unit

Side walls of the roof unit made of coated zinc sheet (anthracite grey, similar to RAL 7016).

Paint finish of below-roof unit

Exterior painting of the below-roof unit in choice of RAL colour.

Supply air silencer

Designed as a sound-absorbing mat made of rock wool; hygienically perfect with high-quality glass silk cover; mounted in the roof unit; insertion loss 3 dB.

Hydraulic assembly throttling circuit

Assembly for hydraulic throttling circuit, sized for the coil in the unit and the Hoval TopTronic® C, consisting of:

- Control valve with volume flow presetting, ball valve and automatic air vent, installed and wired in the roof unit
- Pre-insulated corrugated pipelines installed in the below-

roof unit for connection to the distribution network
Pipelines in the roof unit and in the below-roof unit to be connected on site, pipelines in the roof unit to be insulated on site

Pump control

Electrical components for controlling a mixing or injection circuit in the load circuit, factory-installed in the unit control box.

Roof frame

Consisting of 4 load-bearing side walls made of galvanised sheet steel with fastening rails for the roof foil, supplied loose with the matching connecting screws.

Assembly, insulation, integration in the roof structure on site.

B

4.2 TopTronic® C – System control

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

Zone allocation

Configured in advance for the customer at the factory:

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

System structure

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

Functions, standard

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

- CO₂ 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 CO₂ or VOC
 ST Standby

- Main operating modes of recirculated air units:

REC . Recirculation, infinitely variably adjustment
 DES.. Destratification
 ST Standby

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

Operation

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

Options for operation

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

Alarms, protection

- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms; forwarding via e-mail can be set in the parameters.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.
- Pre-programmed data points retrievable via logger function for 1 year

Options for the zone control panel

- Alarm lamp
- Socket

Per zone:

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

Power distribution

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

4.3 TopTronic® C – System control for TopVent® C-SYS

Control system for the energy-optimised operation of decentralised Hoval indoor climate systems. Maximum system size per system bus: 1 control zone with up to 6 supply air handling units and 10 recirculation air handling 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:
 - Operating panel
 - Zone controller
 - Fresh air temperature sensor
 - 1 Room temperature sensor (expandable to up to 4 room temperature sensors)
 - Safety relay
 - Electrical cabinet internally pre-wired
- 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
- 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 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 CO₂ or VOC
 - ST Standby
- Main operating modes of recirculated air units:
 - REC . Recirculation, infinitely variably adjustment
 - DES.. Destratification
 - ST Standby
- Forced heating (construction site heating) can be activated on each device before completion of the overall system (activation by Hoval service technician)
- Control of draught-free air distribution with the Hoval Air-Injector: the discharge direction is adjusted infinitely variably and automatically according to the respective operating condition and the existing temperatures (heating/cooling).

Operation

- Operating panel with LCD display, installed in the door of the zone control panel for visualisation and control of all Hoval indoor climate units registered on the bus

Options for operation

- 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

4.4 EasyTronic EC

Room temperature controller with timer for TopVent® TH, TC, CH, CC, TV recirculation units and TopVent® TW air curtains, protection rating IP 30, with the following functions:

- Recording the room temperature with the integrated temperature sensor
- Connection option for external room temperature sensor
- Room temperature control in on/off mode
- Lowering of the room temperature setpoint value via week programme
- Unit control depending on a door contact switch
- Manual adjustment of the fan speed
- Manual adjustment of air distribution with the Hoval Air-Injector from vertical to horizontal (for TopVent® TH, TC, CH, CC)
- Signal for switching a pump or a valve
- Fan off delay in cooling mode
- External heating/cooling changeover
- Alarm display
- Connection to the building management system via Modbus RTU

Options

- External room temperature sensor (protection rating IP 65)



TopVent® CC

Recirculation unit configured as roof unit for heating and cooling spaces up to 25 m in height with central heat and cold supply (2-pipe-system)

1 Use 22

2 Construction and operation 22

3 Technical data 25

4 Specification texts 30



C

1 Use

1.1 Intended use

TopVent® CC is a recirculation unit for heating and cooling spaces up to 25 m in height with central heat and cold supply. It fulfils the following functions:

- Heating (with connection to a hot water supply)
- Cooling (with connection to a water chiller)
- Recirculation operation
- Air distribution and destratification with adjustable Air-Injector
- Air filtration

TopVent® CC is configured as a roof unit. It is installed in the roof to save space and does not protrude far into the room. Maintenance work is carried out from the roof without causing disruption to operations in the building.

TopVent® CC units comply with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of energy-related products. They are systems of the 'fan coil unit' type, provided for in Commission Regulation (EU) 2016/2281.

The Hoval TopTronic® C integrated control system ensures energy-efficient, demand-based operation of Hoval indoor climate systems.

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

1.2 User group

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

2 Construction and operation

2.1 Construction

The TopVent® CC unit consists of the following components:

Roof unit

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 following components:

- Fan
 - Heating/cooling section
 - Coil for heating and cooling the supply air with hot water or cold water
 - Condensate separator
 - Extract air filter
 - Unit control box (part of the TopTronic® C control system)
- All components are easily accessible for maintenance work through large access openings.

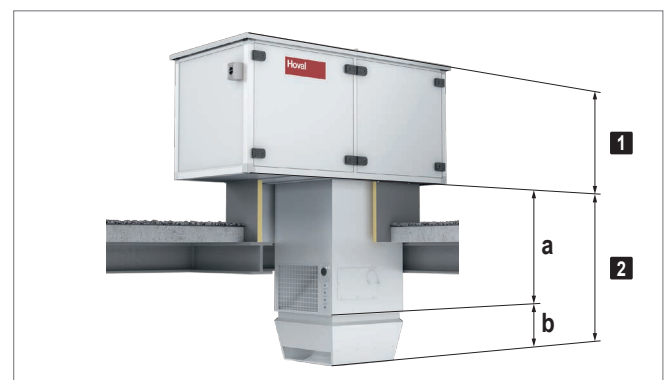
Below-roof unit

The below-roof unit comprises the following components:

- Connection module:

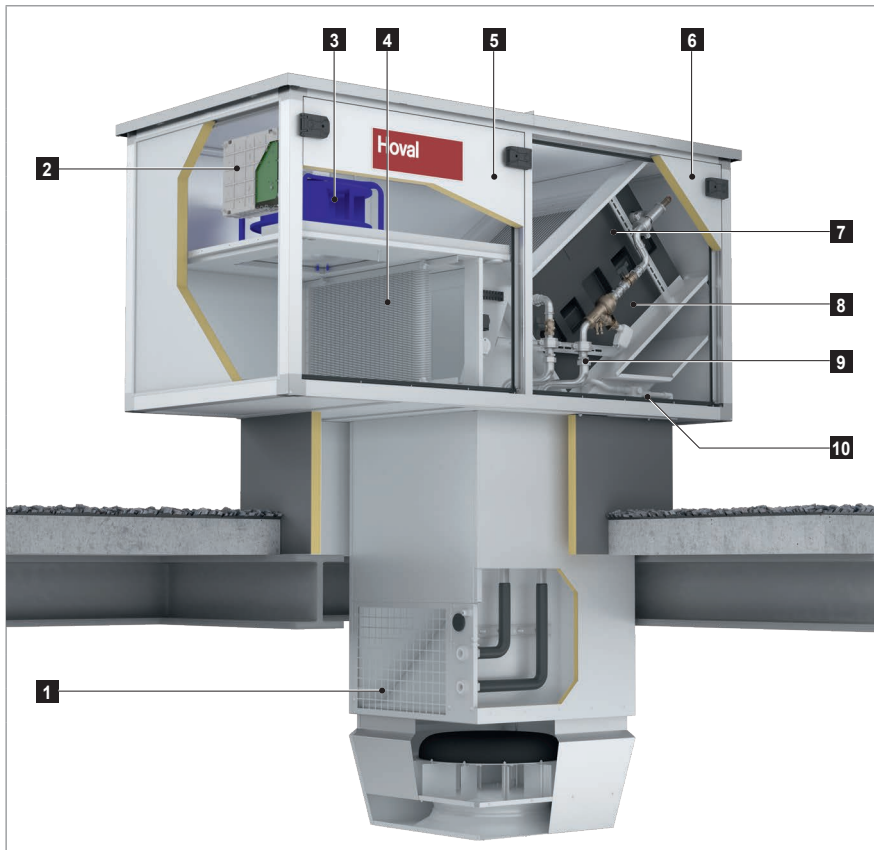
The connection module serves as an air duct through the roof and for drawing in extract air from the hall through the extract air grille. To enable easy adaptation to local installation conditions, the connection module is available in 3 lengths.
- Air-Injector:

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.



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

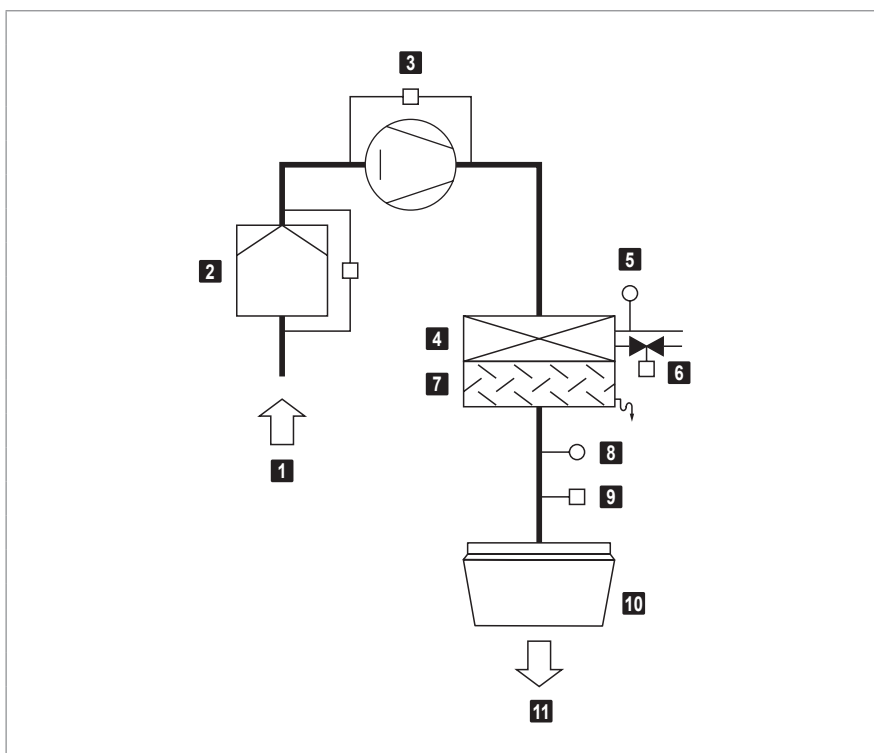
Fig. C1: TopVent® CC components



- 1** Extract air grille
- 2** Unit control box
- 3** Fan
- 4** Extract air filter
- 5** Fan access door
- 6** Hydraulic connection access door
- 7** Heating/cooling coil
- 8** Condensate separator
- 9** Hydraulic assembly throttling circuit
- 10** Condensate drain

Fig. C2: TopVent® CC construction

2.2 Function diagram



- 1** Extract air
- 2** Extract air filter with differential pressure switch
- 3** Fan with flow rate monitoring
- 4** Heating/cooling coil
- 5** Return temperature sensor
- 6** Control valve with actuator (option)
- 7** Condensate separator
- 8** Supply air temperature sensor
- 9** Actuator Air-Injector
- 10** Air-Injector
- 11** Supply air

Fig. C3: TopVent® CC function diagram

2.3 Operating modes

TopVent® CC operates in the following modes:

- Recirculation
- Recirculation speed 1
- Standby

The TopTronic® C control system regulates these operating modes automatically for each control zone in accordance with the specifications in the calendar. The following points also apply:

- The operating mode of a control zone can be switched over manually.
- Each TopVent® CC unit can operate individually in a local operating mode: Off, Recirculation, Recirculation speed 1.

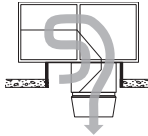
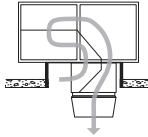
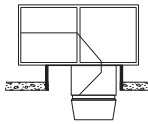
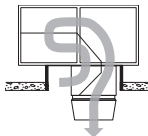
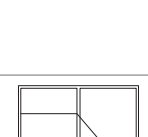
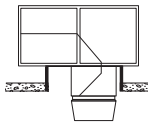
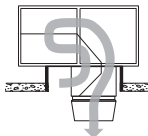
Code	Operating mode		Description
REC	Recirculation On/Off operation: during heat or cool demand, the unit draws in room air, heats or cools it and blows it back into the room. The room temperature set value day is active.		Fan speed 1/2 ¹⁾ Heating/cooling on ¹⁾ 1) Depending on heat or cool demand
	DES ■ Destratification: To avoid heat build-up under the ceiling, it may be appropriate to switch on the fan when there is no heat or cool demand (either in permanent operation or in on/off operation depending on the temperature stratification, as desired).		Fan speed 2 Heating/cooling off
REC1	Recirculation speed 1 The same as REC, but the unit operates only at speed 1 (low air flow rate)		Fan speed 1 Heating/cooling on ¹⁾ 1) Depending on heat or cool demand
	DES ■ Destratification: The same as for REC, but the unit operates only at speed 1		Fan speed 1 Heating/cooling off
ST	Standby The unit is ready for operation. The following operating modes are activated if required:		
	CPR ■ Cooling protection: If the room temperature drops below the set value for cooling protection, the unit heats up the room in recirculation operation.		Fan speed 2 Heating on
	OPR ■ Overheating protection: If the room temperature rises above the set value for overheating protection, the unit cools down the room in recirculation operation.		Fan speed 2 Cooling on
L_OFF	Off (local operating mode) The unit is switched off. Frost protection for the unit remains active.		Fan off Heating/cooling off
-	Forced heating The unit draws in room air, warms it and blows it back into the room. Forced heating is activated by connecting the unit to a power supply (only if there is no bus connection to the zone controller). For example, it is suitable for heating the hall before taking the control system into operation or if the controller fails during the heating period.		Fan speed 2 Heating on

Table C1: TopVent® CC operating modes

3 Technical data

3.1 Type code

CC - 6 - C ...	
Unit type	TopVent® CC
Unit size	6 or 9
Heating/cooling section	C with coil type C D with coil type D
Further options	

Table C2: TopVent® CC type code

3.2 Application limits

Extract air temperature	max.	°C	45
Moisture content of extract air	max.	g/kg	15
Supply air temperature	max.	°C	60
Temperature of the heating medium	max.	°C	90
Pressure of the heating medium	max.	kPa	800
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
 - Places with a corrosive or aggressive environment
 - Spaces with a large amount of dust
 - Areas where there is danger of explosion

Table C3: TopVent® CC application limits

3.3 Electrical connection

Unit type		CC-6	CC-9
Supply voltage	V AC	3 x 400	3 x 400
Permitted voltage tolerance	%	± 5	± 5
Frequency	Hz	50	50
Connected load	kW	2.23	3.33
Current consumption max.	A	4.17	5.87
Series fuse	A	13	13
Protection rating	-	IP 54	IP 54

Table C4: TopVent® CC electrical connections

3.4 Air flow rate

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

Table C5: TopVent® CC air flow rate

3.5 Air filtration

Filter	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 C6: TopVent® CC air filtration

3.6 Sound level

Unit type		CC-6-C		CC-9-C		
		indoors	outdoors	indoors	outdoors	
Sound pressure level (at a dist. 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 C7: TopVent® CC sound level

3.7 Heat output

Heating medium temperature			80/60 °C					60/40 °C				
Size	Type	t_{room}	Q	H_{max}	t_s	Δp_W	m_W	Q	H_{max}	t_s	Δp_W	m_W
		°C	kW	m	°C	kPa	l/h	kW	m	°C	kPa	l/h
CC-6	C	16	76.0	9.4	55.6	18	3267	45.0	11.8	40.3	6	1935
		20	70.3	9.8	56.8	16	3022	39.3	12.5	41.5	5	1690
CC-9	C	16	117.9	9.8	56.9	18	5066	69.9	12.3	41.1	6	3003
		20	109.1	10.2	58.0	15	4686	61.0	13.1	42.1	5	2622
	D	16	140.7	9.1	64.4	15	6045	85.4	11.3	46.2	5	3670
		20	130.4	9.5	65.0	13	5600	75.1	12.0	46.8	4	3225

Legend: Type = Type of coil t_s = Supply air temperature
 t_{room} = Room air temperature Δp_W = Water pressure drop
 Q = Heat output m_W = Water quantity
 H_{max} = Maximum mounting height

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

Table C8: TopVent® CC heat output

3.8 Cooling capacity

Cooling medium temperature				6/12 °C						8/14 °C					
Size	Type	t_{room}	RH_{room}	Q_{sen}	Q_{tot}	t_s	Δp_W	m_W	m_C	Q_{sen}	Q_{tot}	t_s	Δp_W	m_W	m_C
		°C	%	kW	kW	°C	kPa	l/h	kg/h	kW	kW	°C	kPa	l/h	kg/h
CC-6	C	22	50	20.4	20.4	13.9	15	2925	0.0	18.0	18.0	15.1	12	2573	0.0
			70	18.5	27.7	14.9	28	3960	13.5	16.0	21.4	16.1	17	3064	7.9
		26	50	25.2	31.1	15.5	36	4448	8.6	22.7	24.8	16.7	23	3552	3.0
			70	23.2	43.7	16.5	71	6263	30.2	20.8	37.5	17.7	52	5367	24.6
CC-9	C	22	50	31.4	31.4	13.6	15	4496	0.0	27.6	27.6	14.9	12	3947	0.0
			70	28.4	44.7	14.6	31	6401	23.9	24.6	28.2	15.9	12	4031	5.2
		26	50	38.8	49.9	15.2	38	7149	16.3	35.0	35.0	16.4	19	5013	0.0
			70	35.9	69.8	16.2	75	9989	49.8	32.0	53.2	17.4	44	7619	31.1
	D	22	50	37.1	37.1	11.8	13	5307	0.0	32.2	32.2	13.4	10	4613	0.0
			70	34.6	56.7	12.6	30	8118	32.5	29.7	45.1	14.2	19	6459	22.6
		26	50	46.4	62.4	12.7	36	8941	23.5	41.6	50.9	14.3	24	7282	13.6
			70	43.9	87.4	13.5	70	12513	63.9	39.1	75.8	15.1	53	10854	54.0

Legend: Type = Type of coil t_s = Supply air temperature
 t_{room} = Room air temperature Δp_W = Water pressure drop
 RH_{room} = Relative humidity of the room air m_W = Water quantity
 Q_{sen} = Sensible cooling capacity m_C = Condensate quantity
 Q_{tot} = Total cooling capacity

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

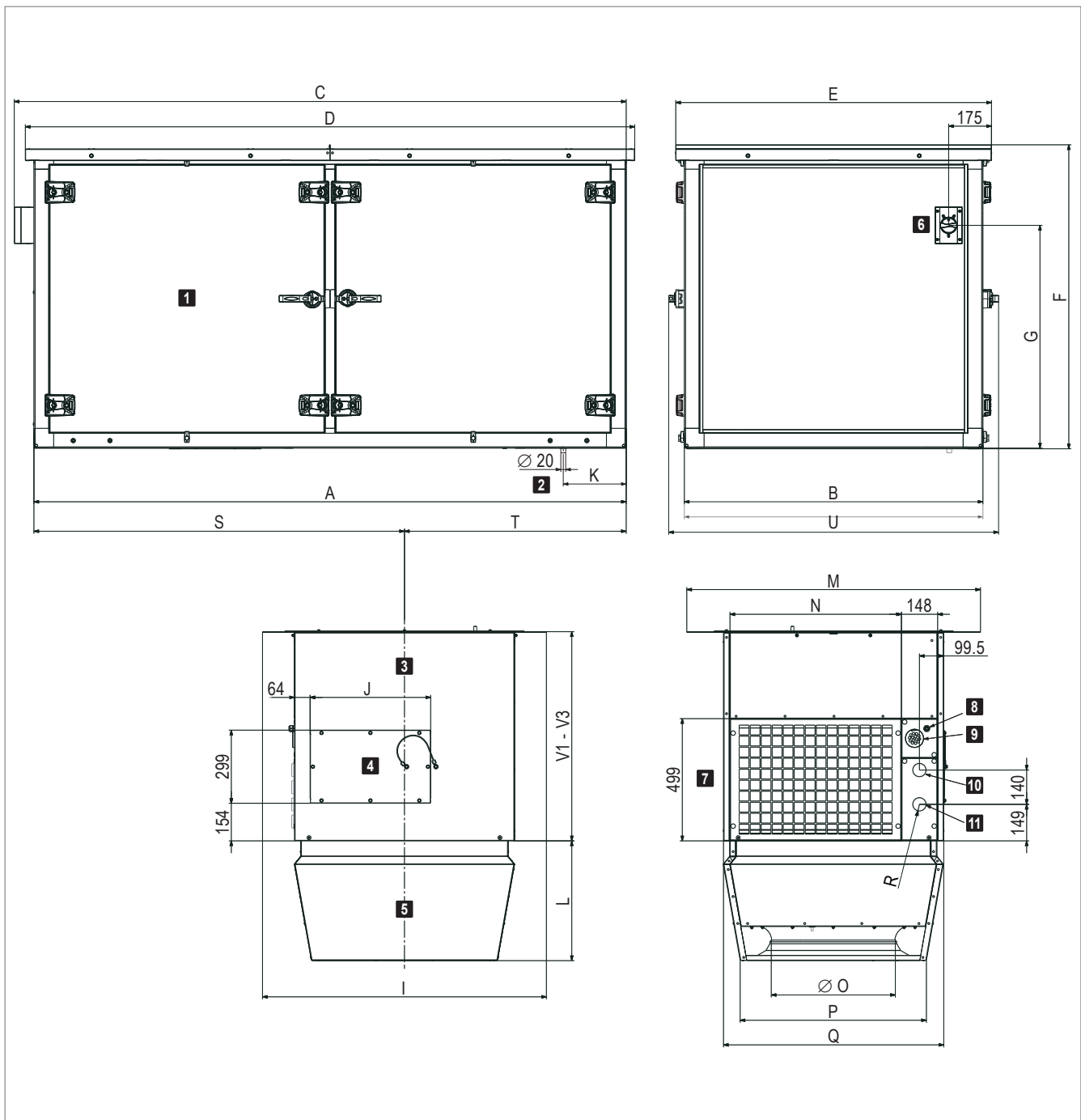
Table C9: TopVent® CC cooling capacity

3.9 Product information according to ErP

Trademark / Model	Hoval TopVent® CC			Unit
	6-C	9-C	9-D	
Cooling capacity (sensible) ($P_{rated,c}$)	26.5	41.0	48.6	kW
Cooling capacity (latent) ($P_{rated,c}$)	5.6	7.3	15.2	kW
Heating capacity ($P_{rated,h}$)	29.8	46.2	54.2	kW
Total electric power input (P_{elec})	1.10	1.94	2.09	kW
Sound power level (L_{WA})	64	68		dB(A)
Contact details	Hoval Aktiengesellschaft Austrasse 70, 9490 Vaduz, Liechtenstein www.hoval.com			

Table C10: Product information according to Commission Regulation (EU) 2016/2281, Table 13

3.10 Dimensions and weights



1 Roof unit	7 Extract air grille
2 Condensate drain	8 Cable gland for power supply
3 Connection module	9 Cable feedthrough for signal cables
4 Installation lid	10 Heating/cooling circuit return
5 Air-Injector	11 Heating/cooling circuit flow
6 Isolation switch	

Table C11: Dimensional drawing for TopVent® CC with hydraulic assembly throttling circuit (dimensions in mm)

Unit type		CC-6	CC-9
A	mm	2420	2725
B	mm	1220	1420
C	mm	2500	2805
D	mm	2490	2795
E	mm	1290	1490
F	mm	1239	1439
G	mm	910	1010
I	mm	1160	1360
J	mm	492	492
K	mm	257	292
L	mm	490	570
M	mm	1200	1400
N	mm	701	901
Ø O	mm	500	630
P	mm	767	937
Q	mm	900	1100
R (internal thread) ¹⁾	"	G 1½	G 1½
S	mm	1514	1684
T	mm	906	1041
U	mm	1348	1548
V1	mm	850	850
V2	mm	1300	1300
V3	mm	1750	1750

¹⁾ TopVent® units without hydraulic assembly: pipe outlets Ø 55 mm

Table C12: TopVent® CC dimensions

Unit type	CC-	6-C	9-C	9-D
Total	kg	647	824	843
Roof unit	kg	505	642	661
Below-roof unit	kg	142	182	182
Air-Injector	kg	40	57	57
Connection module V1	kg	102	125	
Additional weight V2	kg	+ 42	+ 50	
Additional weight V3	kg	+ 85	+ 101	

Table C13: TopVent® CC weights

Heating/cooling section		6-C	9-C	9-D
Connection (internal thread)	"	Rp 1¼	Rp 1½	Rp 2
Water content of the coil	l	7.9	12.4	19.2

Table C14: Hydraulic connection of the heating/cooling section in the roof unit (without hydraulic assembly throttling circuit)

4 Specification texts

4.1 TopVent® CC

Recirculation unit for heating and cooling rooms up to 25 m in height with central heat and cold supply (2-pipe system); configured as roof unit; equipped with highly efficient air distributor; maximum floor area reached per unit 537 m² (size 6) and 946 m² respectively (size 9). The unit consists of the following components:

- Roof unit (with access to all components relevant for maintenance)
- Below-roof unit, consisting of:
 - Connection module
 - Air-Injector
- Optional components

TopVent® CC units comply with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of energy-related products. They are systems of the 'fan coil unit' type, provided for in Commission Regulation (EU) 2016/2281.

Roof unit

Self-supporting casing, construction made of thermally decoupled aluminium profile frame system with nylon connecting elements and panels made of magnesium-zinc sheet, additional rain canopy made of aluminium:

- 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 includes:

Fan

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

Heating/cooling section

The heating/cooling section contains:

- The highly efficient heating/cooling coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the hot water and cold water supply

- 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 drain on the roof via siphon

Extract air filter

Pleated cell filter of filter class ePM₁ 55% according to ISO 16890, consisting of micro glass with synthetic lamination as handle protection, pleat pack completely encapsulated to prevent leakage, frame made of recycled plastic, fully incinerable, including differential pressure switch for filter monitoring.

Unit control box

Control box for connection of the power supply and housing the control components that facilitate energy-optimised operation, controlled by the control system TopTronic® C. Plastic casing, protection rating IP 56. The following components are installed:

- Circuit board with all required electrical components, unit controller (clipped on) as well as connection terminals for all internal and the following external connections:
 - Heating/cooling valve
 - Heating/cooling pump
 - Door contact

The circuit board is fitted with push-in terminals facilitating easy installation of the connection cables. All components in the unit control box as well as sensors, actuators in the unit and the isolation switch attached to the outside of the unit are fully factory-wired.

Power supply, bus connection, connection to Air-Injector actuator to be installed on site

Terminal box (variant)

Terminal box fitted at the side of the housing for connection of the power supply and peripheral components of the unit. Plastic casing, protection rating IP 56. The following components are installed:

- Circuit board with all required electrical components as well as connection terminals for the following signals:
 - Input Enable fan
 - Input Control signal fan
 - Output Control signal next fan
 - Input Control signal actuator Air-Injector
 - Output Control signal next actuator Air-Injector
 - Output Feedback control signal Air-Injector
 - Output Error
- The following components in the unit are factory-wired:
 - Isolation switch
 - Fan
 - Supply air temperature sensor

Access openings

Defined side walls of the roof unit configured as inspection doors for easy access to all components relevant for maintenance. The hinges allow opening with an opening angle of 90° or complete removal of the inspection doors.

Below-roof unit

Connection module V1

Housing made of magnesium zinc sheet, air-tight, flame retardant, with highly efficient insulation made of expanded polystyrene, hygienic and easy to maintain because of smooth interior surfaces and ageing-resistant, silicone-free sealing materials; configured with:

- Extract air grille
- Cable feedthroughs for the electric supply
- Pipe feedthroughs for the hydraulic supply

Installation and insulation of the pipelines on site

Connection module V2 / V3 (variant)

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

Design with Air-Injector

Housing made of magnesium zinc sheet, air-tight, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored Polycell, 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

Actuator installed in the connection module for easy access from the roof.

Design without Air-Injector (variant)

Unit configured without vortex air distributor for connection to an on-site supply air duct and air distribution within the building.

Air distribution box (variant)

Housing made of magnesium zinc sheet, air-tight, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, insulated on the inside with close-pored Polycell; configured with 2 collars as connecting piece to the on-site air distribution system.

Options for the unit

Coating of roof unit

Side walls of the roof unit made of coated zinc sheet (anthracite grey, similar to RAL 7016).

Paint finish of below-roof unit

Exterior painting of the below-roof unit in choice of RAL colour.

Supply air silencer

Designed as a sound-absorbing mat made of rock wool; hygienically perfect with high-quality glass silk cover; mounted in the roof unit; insertion loss 3 dB.

Hydraulic assembly throttling circuit

Assembly for hydraulic throttling circuit, sized for the coil in the unit and the Hoval TopTronic® C, consisting of:

- Control valve with volume flow presetting, ball valve and automatic air vent, installed and wired in the roof unit
- Pre-insulated corrugated pipelines installed in the below-roof unit for connection to the distribution network

Pipelines in the roof unit and in the below-roof unit to be connected on site, pipelines in the roof unit to be insulated on site

Pump control

Electrical components for controlling a mixing or injection circuit in the load circuit, factory-installed in the unit control box.

Roof frame

Consisting of 4 load-bearing side walls made of galvanised sheet steel with fastening rails for the roof foil, supplied loose with the matching connecting screws.

Assembly, insulation, integration in the roof structure on site.

4.2 TopTronic® C – System control

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

Zone allocation

Configured in advance for the customer at the factory:

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

System structure

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

Functions, standard

- Zone-based autonomous room control. Temperature and ventilation control separately adjustable for each zone
- Room temperature control via room-supply air cascade by means of energy-optimised double sequence control with priority circuit for energy recovery (supply and extract air handling units)
- Intelligent automatic heating to reach the desired room temperature at the switching time
- 5 adjustable room temperature set values per zone:
 - Cooling protection (lower setpoint in standby)
 - Overheating protection (upper setpoint in standby)
 - Room set value winter
 - Room set value summer
 - Night cooling set value (free cooling) (supply and extract air handling units, 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:
 - CO₂ 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 CO₂ or VOC
 - ST Standby

- Main operating modes of recirculated air units:
 - REC . Recirculation, infinitely variably adjustment
 - DES.. Destratification
 - ST Standby

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

Operation

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

Options for operation

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

Alarms, protection

- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms; forwarding via e-mail can be set in the parameters.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.
- Pre-programmed data points retrievable via logger function for 1 year

Options for the zone control panel

- Alarm lamp
- Socket

Per zone:

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

Power distribution

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

4.3 TopTronic® C – System control for TopVent® C-SYS

Control system for the energy-optimised operation of decentralised Hoval indoor climate systems. Maximum system size per system bus: 1 control zone with up to 6 supply air handling units and 10 recirculation air handling 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:
 - Operating panel
 - Zone controller
 - Fresh air temperature sensor
 - 1 Room temperature sensor (expandable to up to 4 room temperature sensors)
 - Safety relay
 - Electrical cabinet internally pre-wired
- 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
- 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 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 CO₂ or VOC
 - ST Standby
- Main operating modes of recirculated air units:
 - REC . Recirculation, infinitely variably adjustment
 - DES.. Destratification
 - ST Standby
- Forced heating (construction site heating) can be activated on each device before completion of the overall system (activation by Hoval service technician)
- Control of draught-free air distribution with the Hoval Air-Injector: the discharge direction is adjusted infinitely variably and automatically according to the respective operating condition and the existing temperatures (heating/cooling).

Operation

- Operating panel with LCD display, installed in the door of the zone control panel for visualisation and control of all Hoval indoor climate units registered on the bus

Options for operation

- 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

4.4 EasyTronic EC

Room temperature controller with timer for TopVent® TH, TC, CH, CC, TV recirculation units and TopVent® TW air curtains, protection rating IP 30, with the following functions:

- Recording the room temperature with the integrated temperature sensor
- Connection option for external room temperature sensor
- Room temperature control in on/off mode
- Lowering of the room temperature setpoint value via week programme
- Unit control depending on a door contact switch
- Manual adjustment of the fan speed
- Manual adjustment of air distribution with the Hoval Air-Injector from vertical to horizontal (for TopVent® TH, TC, CH, CC)
- Signal for switching a pump or a valve
- Fan off delay in cooling mode
- External heating/cooling changeover
- Alarm display
- Connection to the building management system via Modbus RTU

Options

- External room temperature sensor (protection rating IP 65)



TopVent® CHC

Recirculation unit configured as roof unit for heating and cooling spaces up to 25 m in height with central heat and cold supply (4-pipe-system)

1 Use 36

2 Construction and operation 36

3 Technical data 39

4 Specification texts 44



D

1 Use

1.1 Intended use

TopVent® CHC is a recirculation unit for heating and cooling spaces up to 25 m in height with central heat and cold supply. It fulfils the following functions:

- Heating (with connection to a hot water supply)
- Cooling (with connection to a water chiller)
- Recirculation operation
- Air distribution and destratification with adjustable Air-Injector
- Air filtration

TopVent® CHC is configured as a roof unit. It is installed in the roof to save space and does not protrude far into the room. Maintenance work is carried out from the roof without causing disruption to operations in the building.

TopVent® CHC units comply with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of energy-related products. They are systems of the 'fan coil unit' type, provided for in Commission Regulation (EU) 2016/2281.

The Hoval TopTronic® C integrated control system ensures energy-efficient, demand-based operation of Hoval indoor climate systems.

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

1.2 User group

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

2 Construction and operation

2.1 Construction

The TopVent® CHC unit consists of the following components:

Roof unit

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 following components:

- Fan
- Heating section
 - Coil for heating the supply air with hot water
- Cooling section
 - Coil for cooling the supply air with cold water
 - Condensate separator
- Extract air filter
- Unit control box (part of the TopTronic® C control system)

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

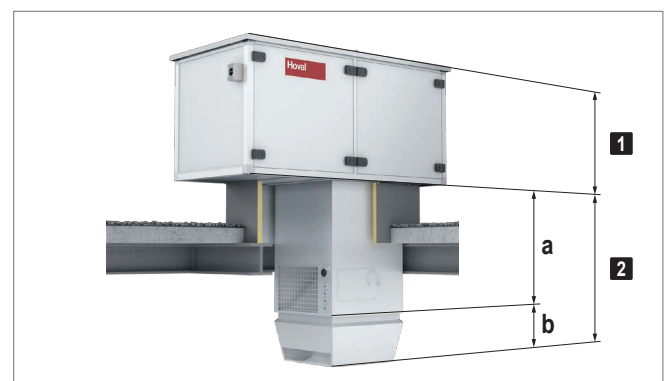
Below-roof unit

The below-roof unit comprises the following components:

- Connection module:

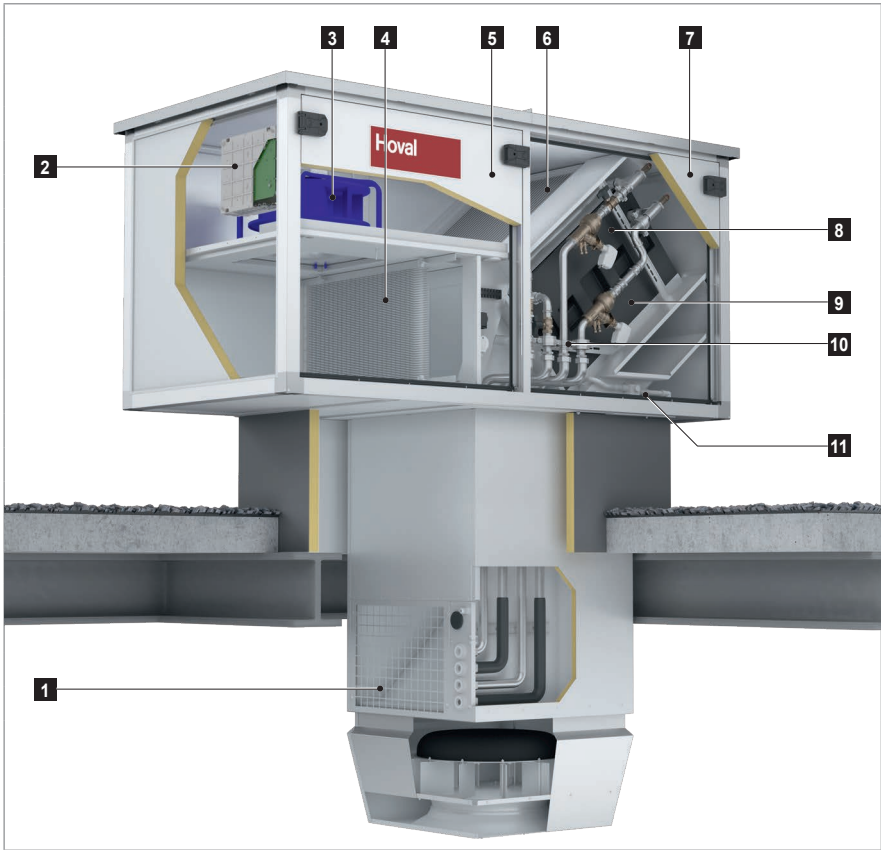
The connection module serves as an air duct through the roof and for drawing in extract air from the hall through the extract air grille. To enable easy adaptation to local installation conditions, the connection module is available in 3 lengths.
- Air-Injector:

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.



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

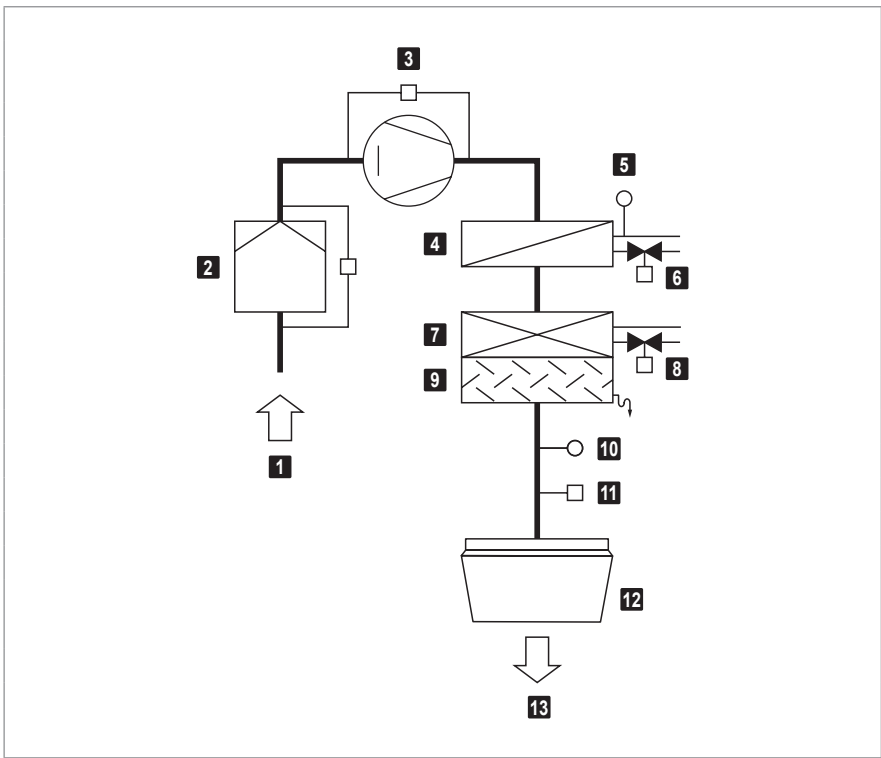
Fig. D1: TopVent® CHC components



- 1 Extract air grille
- 2 Unit control box
- 3 Fan
- 4 Extract air filter
- 5 Fan access door
- 6 Heating coil
- 7 Hydraulic connection access door
- 8 Cooling coil
- 9 Condensate separator
- 10 Hydraulic assembly throttling circuit
- 11 Condensate drain

Fig. D2: TopVent® CHC construction

2.2 Function diagram



- 1 Extract air
- 2 Extract air filter with differential pressure switch
- 3 Fan with flow rate monitoring
- 4 Heating coil
- 5 Return temperature sensor
- 6 Control valve with actuator (option)
- 7 Cooling coil
- 8 Control valve with actuator (option)
- 9 Condensate separator
- 10 Supply air temperature sensor
- 11 Actuator Air-Injector
- 12 Air-Injector
- 13 Supply air

Fig. D3: TopVent® CHC function diagram

2.3 Operating modes

TopVent® CHC operates in the following modes:

- Recirculation
- Recirculation speed 1
- Standby

The TopTronic® C control system regulates these operating modes automatically for each control zone in accordance with the specifications in the calendar. The following points also apply:

- The operating mode of a control zone can be switched over manually.
- Each TopVent® CHC unit can operate individually in a local operating mode: Off, Recirculation, Recirculation speed 1.

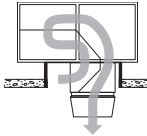
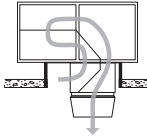
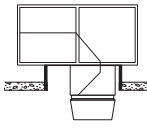
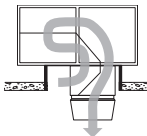
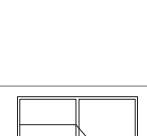
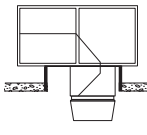
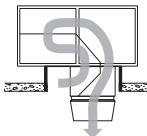
Code	Operating mode		Description
REC	Recirculation On/Off operation: during heat or cool demand, the unit draws in room air, heats or cools it and blows it back into the room. The room temperature set value day is active.		Fan speed 1/2 ¹⁾ Heating/cooling on ¹⁾ 1) Depending on heat or cool demand
	DES ■ Destratification: To avoid heat build-up under the ceiling, it may be appropriate to switch on the fan when there is no heat or cool demand (either in permanent operation or in on/off operation depending on the temperature stratification, as desired).		Fan speed 2 Heating/cooling off
REC1	Recirculation speed 1 The same as REC, but the unit operates only at speed 1 (low air flow rate)		Fan speed 1 Heating/cooling on ¹⁾ 1) Depending on heat or cool demand
	DES ■ Destratification: The same as for REC, but the unit operates only at speed 1		Fan speed 1 Heating/cooling off
ST	Standby The unit is ready for operation. The following operating modes are activated if required:		
	CPR ■ Cooling protection: If the room temperature drops below the set value for cooling protection, the unit heats up the room in recirculation operation.		Fan speed 2 Heating on
	OPR ■ Overheating protection: If the room temperature rises above the set value for overheating protection, the unit cools down the room in recirculation operation.		Fan speed 2 Cooling on
L_OFF	Off (local operating mode) The unit is switched off. Frost protection for the unit remains active.		Fan off Heating/cooling off
-	Forced heating The unit draws in room air, warms it and blows it back into the room. Forced heating is activated by connecting the unit to a power supply (only if there is no bus connection to the zone controller). For example, it is suitable for heating the hall before taking the control system into operation or if the controller fails during the heating period.		Fan speed 2 Heating on

Table D1: TopVent® CHC operating modes

3 Technical data

3.1 Type code

	CHC - 6 B C ...
Unit type	TopVent® CHC
Unit size	6 or 9
Heating section	A with coil type A B with coil type B C with coil type C
Cooling section	C with coil type C D with coil type D
Further options	

Table D2: TopVent® CHC type code

3.2 Application limits

Extract air temperature	max.	°C	45
Moisture content of extract air	max.	g/kg	15
Supply air temperature	max.	°C	60
Temperature of the heating medium	max.	°C	90
Pressure of the heating medium	max.	kPa	800
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			
■ Places with a corrosive or aggressive environment			
■ Spaces with a large amount of dust			
■ Areas where there is danger of explosion			

Table D3: TopVent® CHC application limits

3.3 Electrical connection

Unit type		CHC-6	CHC-9
Supply voltage	V AC	3 x 400	3 x 400
Permitted voltage tolerance	%	± 5	± 5
Frequency	Hz	50	50
Connected load	kW	2.43	3.53
Current consumption max.	A	4.17	5.87
Series fuse	A	13	13
Protection rating	-	IP 54	IP 54

Table D4: TopVent® CHC electrical connections

3.4 Air flow rate

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

Table D5: TopVent® CHC air flow rate

3.5 Air filtration

Filter	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 D6: TopVent® CHC air filtration

3.6 Sound level

Unit type		CHC-6CC		CHC-9CC		
		indoors	outdoors	indoors	outdoors	
Sound pressure level (at a dist. of 5 m) ¹⁾		dB(A)	55	43	59	47
Total sound power level		dB(A)	77	65	81	69
Octave sound power level	63 Hz	dB	45	41	47	43
	125 Hz	dB	58	54	60	56
	250 Hz	dB	67	59	70	62
	500 Hz	dB	71	61	73	63
	1000 Hz	dB	73	58	77	62
	2000 Hz	dB	69	57	75	63
	4000 Hz	dB	64	47	70	53
	8000 Hz	dB	63	39	65	41

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

Table D7: TopVent® CHC sound level

3.7 Heat output

Heating medium temperature			80/60 °C					60/40 °C				
Size	Type	t _{room} °C	Q kW	H _{max} m	t _s °C	Δp _w kPa	m _w l/h	Q kW	H _{max} m	t _s °C	Δp _w kPa	m _w l/h
CHC-6	A	16	32.8	13.4	34.2	7	1410	18.8	16.8	27.3	2	807
		20	30.3	14.0	37.0	6	1301	16.2	17.9	30.0	2	697
	B	16	47.0	11.6	41.3	13	2020	26.9	14.6	31.3	4	1157
		20	43.4	12.0	43.5	11	1864	23.3	15.5	33.5	3	1001
	C	16	76.0	9.4	55.6	18	3267	45.0	11.8	40.3	6	1935
		20	70.3	9.8	56.8	16	3022	39.3	12.5	41.5	5	1690
CHC-9	A	16	55.5	13.6	36.3	8	2386	31.7	17.0	28.5	3	1364
		20	51.2	14.1	38.9	7	2201	27.4	18.1	31.1	2	1179
	B	16	71.2	12.2	41.5	12	3060	40.6	15.4	31.4	4	1746
		20	65.7	12.7	43.7	10	2823	35.1	16.5	33.6	3	1509
	C	16	117.9	9.8	56.9	18	5066	69.9	12.3	41.1	6	3003
		20	109.1	10.2	58.0	15	4686	61.0	13.1	42.1	5	2622

Legend: Type = Type of coil t_s = Supply air temperature
t_{room} = Room air temperature Δp_w = Water pressure drop
Q = Heat output m_w = Water quantity
H_{max} = Maximum mounting height

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

Table D8: TopVent® CHC heat output

3.8 Cooling capacity

Cooling medium temperature				6/12 °C						8/14 °C					
Size	Type	t _{room} °C	RH _{room} %	Q _{sen} kW	Q _{tot} kW	t _s °C	Δp _w kPa	m _w l/h	m _c kg/h	Q _{sen} kW	Q _{tot} kW	t _s °C	Δp _w kPa	m _w l/h	m _c kg/h
CHC-6	C	22	50	20.4	20.4	13.9	15	2925	0.0	20.4	20.4	13.9	15	2925	0.0
			70	18.5	27.7	14.9	28	3960	13.5	16.0	21.4	16.1	17	3064	7.9
		26	50	25.2	31.1	15.5	36	4448	8.6	22.7	24.8	16.7	23	3552	3.0
			70	23.2	43.7	16.5	71	6263	30.2	20.8	37.5	17.7	52	5367	24.6
CHC-9	C	22	50	31.4	31.4	13.6	15	4496	0.0	31.4	31.4	13.6	15	4496	0.0
			70	28.4	44.7	14.6	31	6401	23.9	24.6	28.2	15.9	12	4031	5.2
		26	50	38.8	49.9	15.2	38	7149	16.3	35.0	35.0	16.4	19	5013	0.0
			70	35.9	69.8	16.2	75	9989	49.8	32.0	53.2	17.4	44	7619	31.1
	D	22	50	37.1	37.1	11.8	13	5307	0.0	37.1	37.1	11.8	13	5307	0.0
			70	34.6	56.7	12.6	30	8118	32.5	29.7	45.1	14.2	19	6459	22.6
		26	50	46.4	62.4	12.7	36	8941	23.5	41.6	50.9	14.3	24	7282	13.6
			70	43.9	87.4	13.5	70	12513	63.9	39.1	75.8	15.1	53	10854	54.0

Legend: Type = Type of coil t_s = Supply air temperature
t_{room} = Room air temperature Δp_w = Water pressure drop
RH_{room} = Relative humidity of the room air m_w = Water quantity
Q_{sen} = Sensible cooling capacity m_c = Condensate quantity
Q_{tot} = Total cooling capacity

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

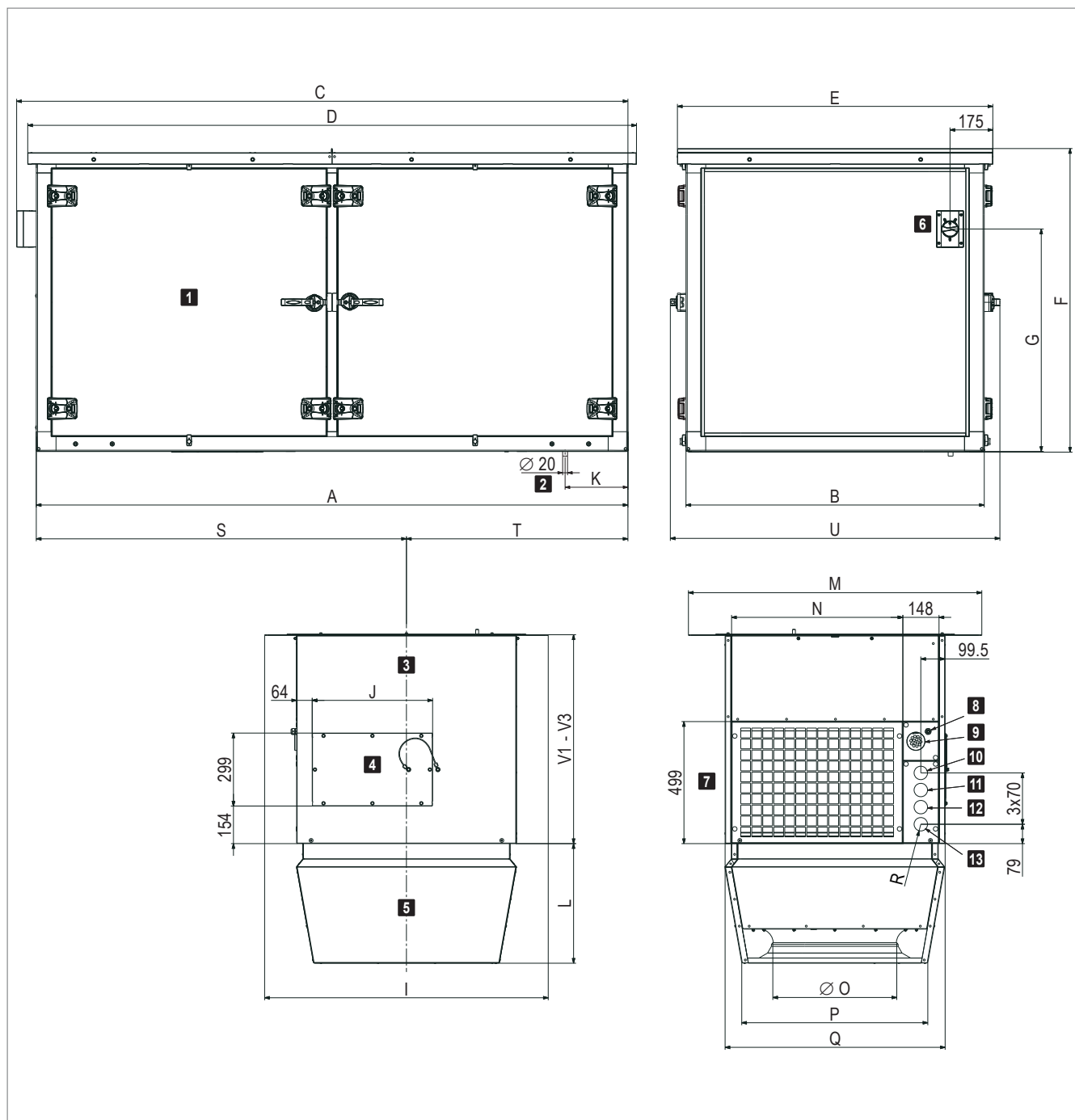
Table D9: TopVent® CHC cooling capacity

3.9 Product information according to ErP

Trademark / Model	Hoval TopVent® CHC									Unit
	6AC	6BC	6CC	9AC	9BC	9CC	9AD	9BD	9CD	
Cooling capacity (sensible) ($P_{rated,c}$)	26.5	26.5	26.5	41	41	41	48.6	48.6	48.6	kW
Cooling capacity (latent) ($P_{rated,c}$)	5.6	5.6	5.6	7.3	7.3	7.3	15.2	15.2	15.2	kW
Heating capacity ($P_{rated,h}$)	13.2	18.9	29.8	22.6	28.5	46.2	22.6	28.5	46.2	kW
Total electric power input (P_{elec})	1.16	1.20	1.29	2.05	2.12	2.27	2.20	2.27	2.42	kW
Sound power level (L_{WA})	65			69						dB(A)
Contact details	Hoval Aktiengesellschaft Austrasse 70, 9490 Vaduz, Liechtenstein www.hoval.com									

Table D10: Product information according to Commission Regulation (EU) 2016/2281, Table 13

3.10 Dimensions and weights



- | | |
|-----------------------------|--|
| 1 Roof unit | 8 Cable gland for power supply |
| 2 Condensate drain | 9 Cable feedthrough for signal cables |
| 3 Connection module | 10 Heating circuit return |
| 4 Installation lid | 11 Cooling circuit return |
| 5 Air-Injector | 12 Heating circuit flow |
| 6 Isolation switch | 13 Cooling circuit flow |
| 7 Extract air grille | |

Table D11: Dimensional drawing for TopVent® CHC with hydraulic assembly throttling circuit (dimensions in mm)

Unit type		CHC-6	CHC-9
A	mm	2420	2725
B	mm	1220	1420
C	mm	2500	2805
D	mm	2490	2795
E	mm	1290	1490
F	mm	1239	1439
G	mm	910	1010
I	mm	1160	1360
J	mm	492	492
K	mm	257	292
L	mm	490	570
M	mm	1200	1400
N	mm	701	901
Ø O	mm	500	630
P	mm	767	937
Q	mm	900	1100
R (internal thread) ¹⁾	"	G 1½	G 1½
S	mm	1514	1684
T	mm	906	1041
U	mm	1348	1548
V1	mm	850	850
V2	mm	1300	1300
V3	mm	1750	1750

¹⁾ TopVent® units without hydraulic assembly: pipe outlets Ø 55 mm

Table D12: TopVent® CHC dimensions

Unit type	CHC-	6AC	6BC	6CC	9AC	9BC	9CC	9AD	9BD	9CD
Total	kg	678	677	684	867	866	879	886	885	898
Roof unit	kg	536	535	542	685	684	697	704	703	716
Below-roof unit	kg	142	142	142	182	182	182	182	182	182
Air-Injector	kg	40	40	40	57	57	57	57	57	57
Connection module V1	kg	102			125					
Additional weight V2	kg	+ 42			+ 50					
Additional weight V3	kg	+ 85			+ 101					

Table D13: TopVent® CHC weights

Heating section		6 A	6B	6C	9 A	9B	9C
Connection (internal thread)	"	Rp 1¼	Rp 1¼	Rp 1¼	Rp 1½	Rp 1½	Rp 1½
Water content of the coil	l	4.6	4.6	7.9	7.4	7.4	12.4

Table D14: Hydraulic connection of the heating section in the roof unit (without hydraulic assembly throttling circuit)

Cooling section		6-C	9-C	9-D
Y (internal thread)	"	Rp 1¼	Rp 1½	Rp 2
Water content of the coil	l	7.9	12.4	19.2

Table D15: Hydraulic connection of the cooling section in the roof unit (without hydraulic assembly throttling circuit)

4 Specification texts

4.1 TopVent® CHC

Recirculation unit for heating and cooling rooms up to 25 m in height with central heat and cold supply (4-pipe system); configured as roof unit; equipped with highly efficient air distributor; maximum floor area reached per unit 537 m² (size 6) and 946 m² respectively (size 9). The unit consists of the following components:

- Roof unit (with access to all components relevant for maintenance)
- Below-roof unit, consisting of:
 - Connection module
 - Air-Injector
- Optional components

TopVent® CHC units comply with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of energy-related products. They are systems of the 'fan coil unit' type, provided for in Commission Regulation (EU) 2016/2281.

Roof unit

Self-supporting casing, construction made of thermally decoupled aluminium profile frame system with nylon connecting elements and panels made of magnesium-zinc sheet, additional rain canopy made of aluminium:

- 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 includes:

Fan

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

Heating section

The heating section contains:

- The highly efficient heating coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the hot water supply

Cooling section

The cooling section contains:

- The highly efficient cooling coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the cold water supply
- 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 drain on the roof via siphon

Extract air filter

Pleated cell filter of filter class ePM₁ 55% according to ISO 16890, consisting of micro glass with synthetic lamination as handle protection, pleat pack completely encapsulated to prevent leakage, frame made of recycled plastic, fully incinerable, including differential pressure switch for filter monitoring.

Unit control box

Control box for connection of the power supply and housing the control components that facilitate energy-optimised operation, controlled by the control system TopTronic® C. Plastic casing, protection rating IP 56. The following components are installed:

- Circuit board with all required electrical components, unit controller (clipped on) as well as connection terminals for all internal and the following external connections:
 - Heating and cooling valve
 - Heating and cooling pump
 - Door contact

The circuit board is fitted with push-in terminals facilitating easy installation of the connection cables. All components in the unit control box as well as sensors, actuators in the unit and the isolation switch attached to the outside of the unit are fully factory-wired.

Power supply, bus connection, connection to Air-Injector actuator to be installed on site

Access openings

Defined side walls of the roof unit configured as inspection doors for easy access to all components relevant for maintenance. The hinges allow opening with an opening angle of 90° or complete removal of the inspection doors.

Below-roof unit

Connection module V1

Housing made of magnesium zinc sheet, air-tight, flame retardant, with highly efficient insulation made of expanded polystyrene, hygienic and easy to maintain because of smooth interior surfaces and ageing-resistant, silicone-free sealing materials; configured with:

- Extract air grille
- Cable feedthroughs for the electric supply
- Pipe feedthroughs for the hydraulic supply

Installation and insulation of the pipelines on site

Connection module V2 / V3 (variant)

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

Design with Air-Injector

Housing made of magnesium zinc sheet, air-tight, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored Polycell, 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

Actuator installed in the connection module for easy access from the roof.

Design without Air-Injector (variant)

Unit configured without vortex air distributor for connection to an on-site supply air duct and air distribution within the building.

Air distribution box (variant)

Housing made of magnesium zinc sheet, air-tight, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, insulated on the inside with close-pored Polycell; configured with 2 collars as connecting piece to the on-site air distribution system.

Options for the unit

Coating of roof unit

Side walls of the roof unit made of coated zinc sheet (anthracite grey, similar to RAL 7016).

Paint finish of below-roof unit

Exterior painting of the below-roof unit in choice of RAL colour.

Supply air silencer

Designed as a sound-absorbing mat made of rock wool; hygienically perfect with high-quality glass silk cover; mounted in the roof unit; insertion loss 3 dB.

Hydraulic assembly throttling circuit

Assembly for hydraulic throttling circuit, sized for the coil in the unit and the Hoval TopTronic® C, consisting of:

- Control valve with volume flow presetting, ball valve and automatic air vent, installed and wired in the roof unit
- Pre-insulated corrugated pipelines installed in the below-roof unit for connection to the distribution network

Pipelines in the roof unit and in the below-roof unit to be connected on site, pipelines in the roof unit to be insulated on site

Pump control

Electrical components for controlling a mixing or injection circuit in the load circuit, factory-installed in the unit control box.

Roof frame

Consisting of 4 load-bearing side walls made of galvanised sheet steel with fastening rails for the roof foil, supplied loose with the matching connecting screws.

Assembly, insulation, integration in the roof structure on site.

4.2 TopTronic® C – System control

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

Zone allocation

Configured in advance for the customer at the factory:

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

System structure

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

Functions, standard

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

- CO₂ 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 CO₂ or VOC
 ST Standby

- Main operating modes of recirculated air units:

REC . Recirculation, infinitely variably adjustment
 DES.. Destratification
 ST Standby

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

Operation

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

Options for operation

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

Alarms, protection

- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms; forwarding via e-mail can be set in the parameters.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.
- Pre-programmed data points retrievable via logger function for 1 year

Options for the zone control panel

- Alarm lamp
- Socket

Per zone:

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

Power distribution

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

4.3 TopTronic® C – System control for TopVent® C-SYS

Control system for the energy-optimised operation of decentralised Hoval indoor climate systems. Maximum system size per system bus: 1 control zone with up to 6 supply air handling units and 10 recirculation air handling 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:
 - Operating panel
 - Zone controller
 - Fresh air temperature sensor
 - 1 Room temperature sensor (expandable to up to 4 room temperature sensors)
 - Safety relay
 - Electrical cabinet internally pre-wired
- 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
- 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 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 CO₂ or VOC
 - ST Standby
- Main operating modes of recirculated air units:
 - REC . Recirculation, infinitely variably adjustment
 - DES.. Destratification
 - ST Standby
- Forced heating (construction site heating) can be activated on each device before completion of the overall system (activation by Hoval service technician)
- Control of draught-free air distribution with the Hoval Air-Injector: the discharge direction is adjusted infinitely variably and automatically according to the respective operating condition and the existing temperatures (heating/cooling).

Operation

- Operating panel with LCD display, installed in the door of the zone control panel for visualisation and control of all Hoval indoor climate units registered on the bus

Options for operation

- 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



TopVent® SH

Supply air unit configured as roof unit for ventilating and heating spaces up to 25 m in height with central heat supply

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E

1 Use

1.1 Intended use

TopVent® SH is a supply air unit for ventilating and heating spaces up to 25 m in height with central heat supply. It fulfils the following functions:

- Heating (with connection to a hot water supply)
- Fresh air supply
- Mixed air operation
- Recirculation operation
- Air distribution and destratification with adjustable Air-Injector
- Air filtration

TopVent® SH is configured as a roof unit. It is installed in the roof to save space and does not protrude far into the room. Maintenance work is carried out from the roof without causing disruption to operations in the building.

The TopVent® SH 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.

The Hoval TopTronic® C integrated control system ensures energy-efficient, demand-based operation of Hoval indoor climate systems.

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

1.2 User group

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

2 Construction and operation

2.1 Construction

The TopVent® SH unit consists of the following components:

Roof unit

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 following components:

- Fan
 - Heating section
 - Coil for heating the supply air with hot water
 - Fresh air and extract air filters
 - Control dampers
 - Unit control box (part of the TopTronic® C control system)
- All components are easily accessible for maintenance work through large access openings.

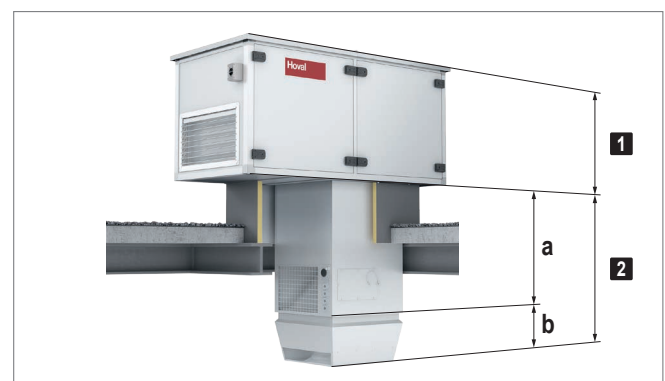
Below-roof unit

The below-roof unit comprises the following components:

- Connection module:

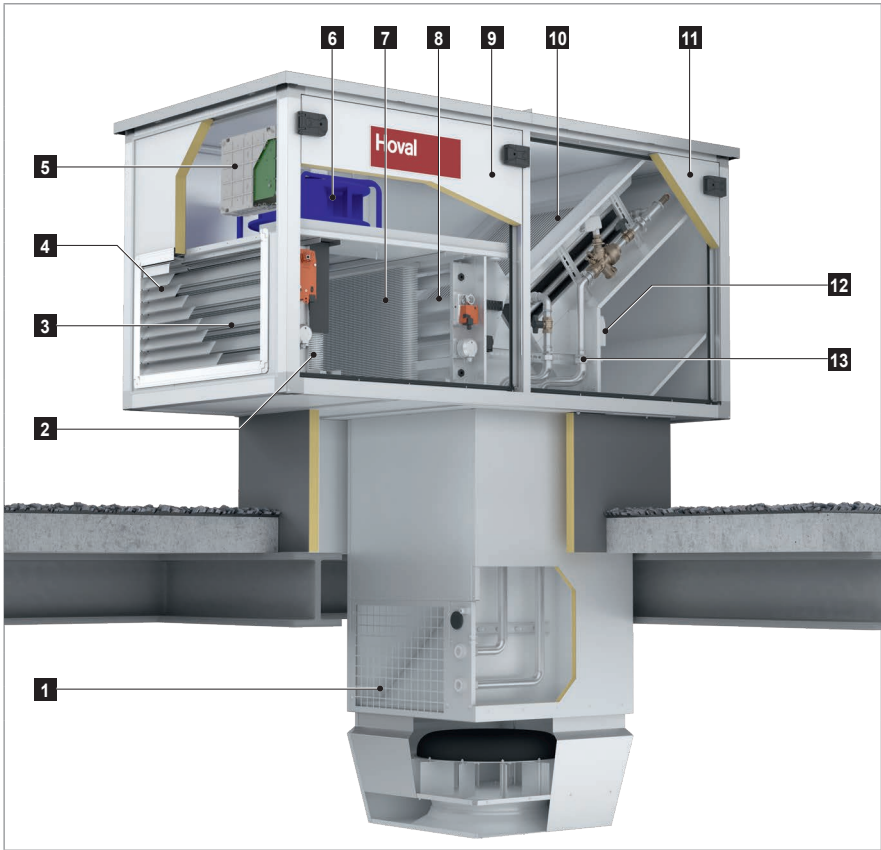
The connection module serves as an air duct through the roof and for drawing in extract air from the hall through the extract air grille. To enable easy adaptation to local installation conditions, the connection module is available in 3 lengths.
- Air-Injector:

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.



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

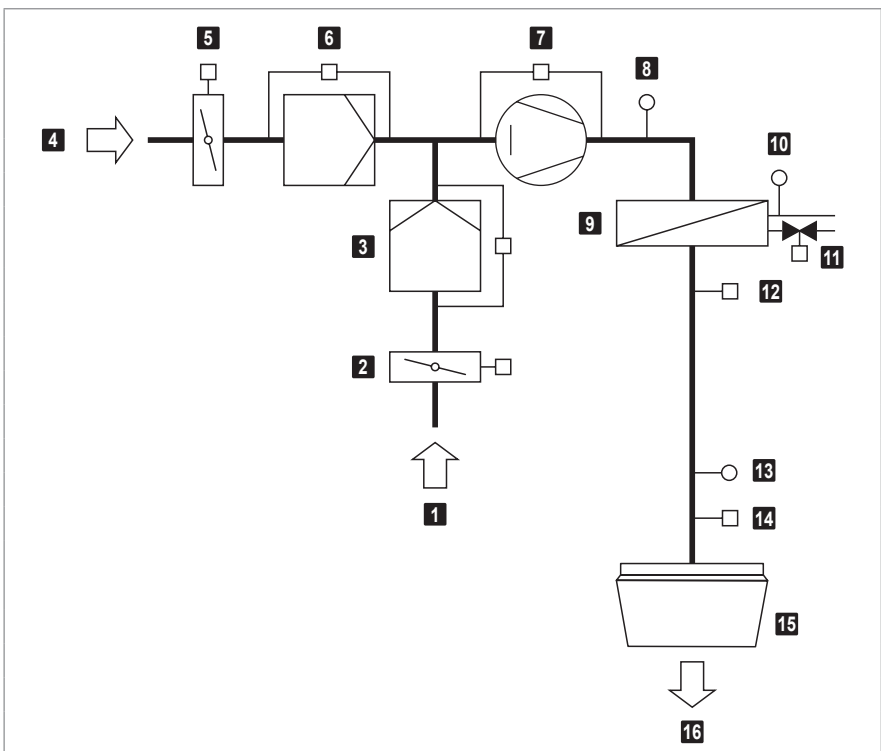
Fig. E1: TopVent® SH components



- 1** Extract air grille
- 2** Fresh air filter
- 3** Fresh air damper
- 4** Weather protection
- 5** Unit control box
- 6** Fan
- 7** Extract air filter
- 8** Recirculation damper
- 9** Fan access door
- 10** Heating coil
- 11** Hydraulic connection access door
- 12** Frost controller
- 13** Hydraulic assembly throttling circuit

Fig. E2: TopVent® SH construction

2.2 Function diagram



- 1** Extract air
- 2** Recirculation damper with actuator
- 3** Extract air filter with differential pressure switch
- 4** Fresh air
- 5** Fresh air damper with actuator
- 6** Fresh air filter with differential pressure switch
- 7** Fan with flow rate monitoring
- 8** Mixed air temperature sensor
- 9** Heating coil
- 10** Return temperature sensor
- 11** Control valve with actuator (option)
- 12** Frost controller
- 13** Supply air temperature sensor
- 14** Actuator Air-Injector
- 15** Air-Injector
- 16** Supply air

Fig. E3: TopVent® SH function diagram

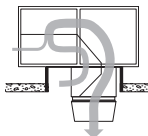

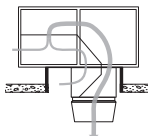
2.3 Operating modes

TopVent® SH operates in the following modes:

- Supply air speed 2
- Supply air speed 1
- 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® SH unit can operate individually in a local operating mode: Off, Supply air speed 2, Supply air speed 1, Recirculation, Recirculation speed 1.

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 according to the heating demand.		Fan speed 2 Fresh air damper..... 10 % open ¹⁾ Heating 0-100 % ²⁾ ¹⁾ Percentage is adjustable ²⁾ Depending on heat demand
	<u>Variable fresh air ratio:</u> <ul style="list-style-type: none"> ■ 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 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. <ul style="list-style-type: none"> – 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 CO₂ or VOC content of the room air is reached, the fresh air damper closes again to the set minimum value. 		Fan speed 2 Fresh air damper..... MIN-100 % open ¹⁾ Heating 0-100 % ²⁾ ¹⁾ A minimum value can be set ²⁾ Depending on heat demand
 Notice In order to save heating energy, the unit only operates with the set minimum fresh air rate when heat is required.			
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 0-100 % ¹⁾ Fixed or variable (see above)

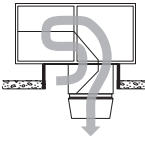
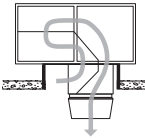
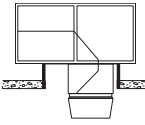
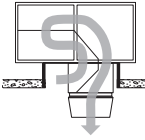
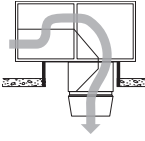
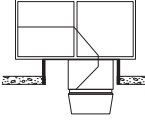
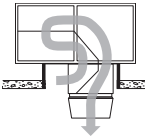
Code	Operating mode		Description
REC	<p>Recirculation On/off-operation: If heating is required, the unit draws in room air, heats it and blows it back into the room. The room temperature set value day is active.</p>		<p>Fan speed 1/2 ¹⁾ Fresh air damper..... closed Heating on ¹⁾</p> <p>¹⁾ Depending on heat demand</p>
DES	<p>■ 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).</p>		<p>Fan speed 2 Fresh air damper..... closed Heating off</p>
REC1	<p>Recirculation speed 1 The same as REC, but the unit operates only at speed 1 (low air flow rate)</p>		<p>Fan speed 1 Fresh air damper..... closed Heating on ¹⁾</p> <p>¹⁾ Depending on heat demand</p>
DES	<p>■ Destratification: The same as for REC, but the unit operates only at speed 1</p>		<p>Fan speed 1 Fresh air damper..... closed Heating off</p>
ST	<p>Standby The unit is ready for operation. The following operating modes are activated if required:</p>		
CPR	<p>■ Cooling protection: If the room temperature drops below the set value for cooling protection, the unit heats up the room in recirculation operation.</p>		<p>Fan speed 2 Fresh air damper..... closed Heating on</p>
NCS	<p>■ 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.</p>		<p>Fan speed 2 Fresh air damper..... open Heating off</p>
L_OFF	<p>Off (local operating mode) The unit is switched off. Frost protection for the unit remains active.</p>		<p>Fan off Fresh air damper..... closed Heating off</p>
-	<p>Forced heating The unit draws in room air, warms it and blows it back into the room. Forced heating can be activated and set as required by the Hoval service technician. For example, it is suitable for heating the hall before taking the control system into operation or if the controller fails during the heating period.</p>		<p>Fan speed 2 ¹⁾ Fresh air damper..... closed ¹⁾ Heating on ¹⁾</p> <p>¹⁾ Adjustable by the Hoval service technician</p>

Table E1: TopVent® SH operating modes

3 Technical data

3.1 Type code

SH - 6 B - ...	
Unit type	TopVent® SH
Unit size	6 or 9
Heating section	A with coil type A B with coil type B C with coil type C
Further options	

Table E2: TopVent® SH type code

3.2 Application limits

Extract air temperature	max.	°C	45
Moisture content of extract air	max.	g/kg	15
Fresh air temperature	min.	°C	-20
	max.	°C	45
Supply air temperature	max.	°C	60
Temperature of the heating medium	max.	°C	90
Pressure of the heating medium	max.	kPa	800
Air flow rate	Size 6:	min.	m³/h 3100
	Size 9:	min.	m³/h 5000
The units cannot be used in:			
■ Damp locations			
■ Places with a corrosive or aggressive environment			
■ Spaces with a large amount of dust			
■ Areas where there is danger of explosion			

Table E3: TopVent® SH application limits

3.3 Electrical connection

Unit type		SH-6	SH-9
Supply voltage	V AC	3 x 400	3 x 400
Permitted voltage tolerance	%	± 5	± 5
Frequency	Hz	50	50
Connected load	kW	2.23	3.33
Current consumption max.	A	4.17	5.87
Series fuse	A	13	13
Protection rating	-	IP 54	IP 54

Table E4: TopVent® SH electrical connections

3.4 Air flow rate

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

Table E5: TopVent® SH air flow rate

3.5 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 E6: TopVent® SH air filtration

3.6 Sound level

Unit type		SH-6C		SH-9C	
		indoors	outdoors ¹⁾	indoors	outdoors ¹⁾
Sound pressure level (at a dist. of 5 m) ²⁾	dB(A)	55	47	58	49
Total sound power level	dB(A)	77	69	80	71
Octave sound power level	63 Hz	45	44	46	44
	125 Hz	61	56	64	57
	250 Hz	67	63	69	63
	500 Hz	71	65	73	65
	1000 Hz	74	60	77	64
	2000 Hz	70	58	75	64
	4000 Hz	66	57	71	61
8000 Hz	65	57	65	57	

¹⁾ with fresh air ratio 10 %

²⁾ with a hemispherical radiation pattern in a low-reflection room

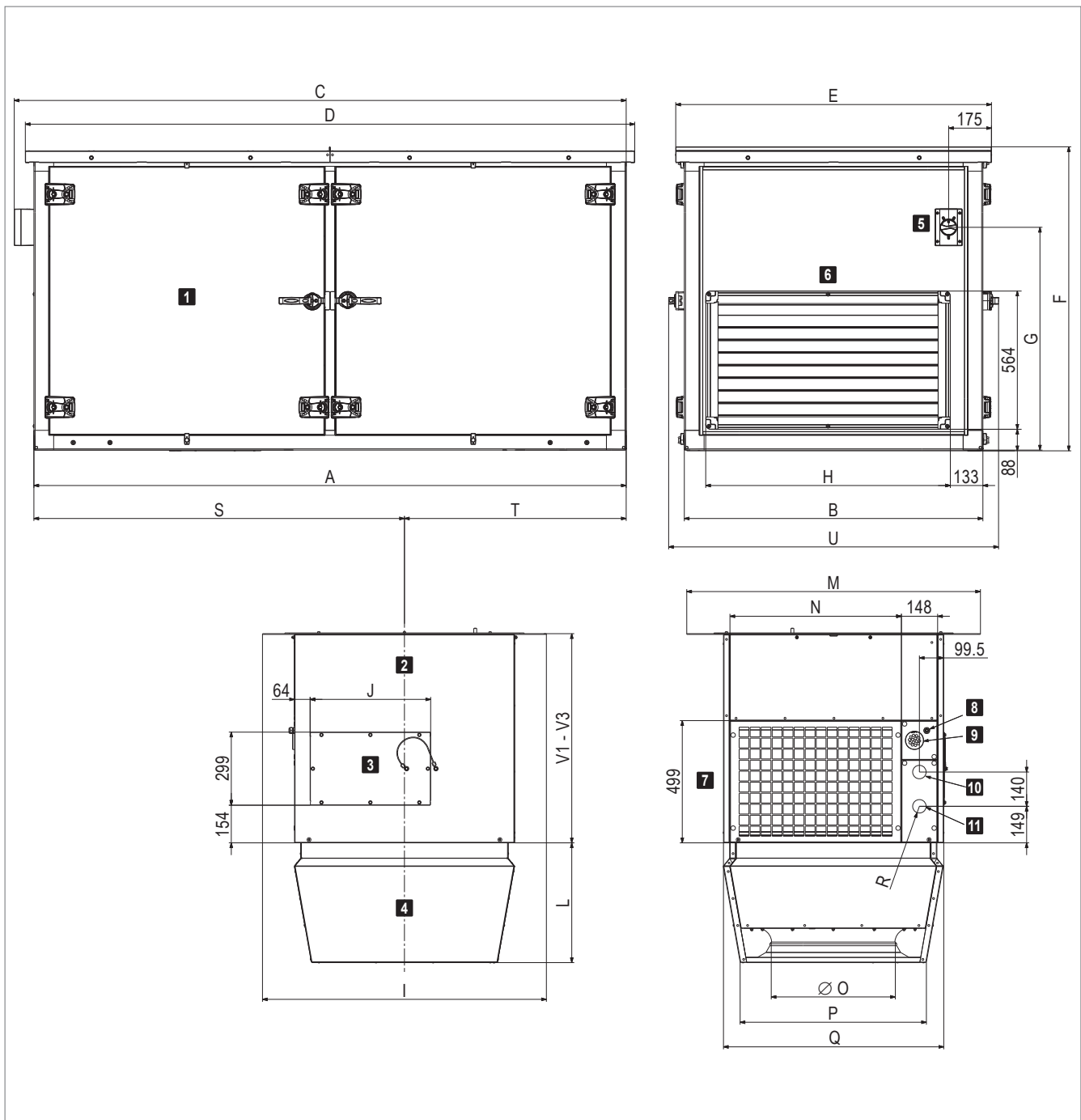
Table E7: TopVent® SH sound level

3.7 Heat output

Heating medium temperature		80/60 °C						60/40 °C				
Size	Type	t _F	Q	H _{max}	t _S	Δp _W	m _W	Q	H _{max}	t _S	Δp _W	m _W
		°C	kW	m	°C	kPa	l/h	kW	m	°C	kPa	l/h
SH-6	A	-5	33.1	14.4	33.9	7	1424	19.1	18.8	27.0	2	820
		-15	33.8	14.7	33.2	8	1451	19.7	19.5	26.3	3	848
	B	-5	47.5	12.1	41.0	13	2040	27.4	15.7	31.1	4	1177
		-15	48.4	12.2	40.5	14	2079	28.3	16.1	30.5	5	1216
	C	-5	76.8	9.7	55.5	18	3297	45.7	12.3	40.1	7	1965
		-15	78.2	9.7	55.2	19	3358	47.2	12.4	39.9	7	2026
SH-9	A	-5	56.1	14.4	36.0	8	2409	32.3	18.8	28.2	3	1387
		-15	57.1	14.6	35.4	8	2455	33.4	19.4	27.5	3	1433
	B	-5	71.9	12.8	41.2	12	3090	41.3	16.7	31.1	4	1775
		-15	73.3	12.9	40.7	13	3149	42.7	17.0	30.6	4	1834
	C	-5	119.0	10.1	56.8	18	5113	71.0	12.9	40.9	7	3050
		-15	121.2	10.1	56.5	19	5208	73.2	12.9	40.7	7	3145
Legend:	Type = Type of coil		t _S = Supply air temperature									
	t _F = Fresh air temperature		Δp _W = Water pressure drop									
	Q = Heat output		m _W = Water quantity									
	H _{max} = Maximum mounting height											
Reference:	<ul style="list-style-type: none"> ■ Room air 18 °C, extract air 20 °C / 20 % rel. humidity ■ Fresh air ratio 10 % 											

Table E8: TopVent® SH heat output

3.8 Dimensions and weights



1 Roof unit	7 Extract air grille
2 Connection module	8 Cable gland for power supply
3 Installation lid	9 Cable feedthrough for signal cables
4 Air-Injector	10 Heating circuit return
5 Isolation switch	11 Heating circuit flow
6 Weather protection	

Table E9: Dimensional drawing for TopVent® SH with hydraulic assembly throttling circuit (dimensions in mm)

Unit type		SH-6	SH-9
A	mm	2420	2725
B	mm	1220	1420
C	mm	2500	2805
D	mm	2490	2795
E	mm	1290	1490
F	mm	1239	1439
G	mm	910	1010
H	mm	999	1199
I	mm	1160	1360
J	mm	492	492
L	mm	490	570
M	mm	1200	1400
N	mm	701	901
Ø O	mm	500	630
P	mm	767	937
Q	mm	900	1100
R (internal thread) ¹⁾	"	G 1½	G 1½
S	mm	1514	1684
T	mm	906	1041
U	mm	1348	1548
V1	mm	850	850
V2	mm	1300	1300
V3	mm	1750	1750

¹⁾ TopVent® units without hydraulic assembly: pipe outlets Ø 55 mm

Table E10: TopVent® SH dimensions

Unit type	SH-	6 A	6B	6C	9 A	9B	9C
Total	kg	655	654	661	834	833	846
Roof unit	kg	513	512	519	652	651	664
Below-roof unit	kg	142	142	142	182	182	182
Air-Injector	kg	40	40	40	57	57	57
Connection module V1	kg	102			125		
Additional weight V2	kg	+ 42			+ 50		
Additional weight V3	kg	+ 85			+ 101		

Table E11: TopVent® SH weights

Heating section		6 A	6B	6C	9 A	9B	9C
Connection (internal thread)	"	Rp 1¼	Rp 1¼	Rp 1¼	Rp 1½	Rp 1½	Rp 1½
Water content of the coil	l	4.6	4.6	7.9	7.4	7.4	12.4

Table E12: Hydraulic connection of the heating section in the roof unit (without hydraulic assembly throttling circuit)

3.9 Product information according to ErP

Trademark / Model		Hoval TopVent® SH						Unit
		6 A	6B	6C	9 A	9B	9C	
Type		NRVU, BVU						–
Drive		Variable speed drive						–
Heat recovery system		none						–
Thermal efficiency of heat recovery (η_{t_nrvu})		–						%
Nominal flow rate (q_{nom})		1.67	1.67	1.67	2.50	2.50	2.50	m³/s
Effective electric power input (P)		0.88	0.91	0.99	1.57	1.64	1.77	kW
Internal specific fan power (SFP_{int})		162	162	162	65	65	65	W/(m³/s)
Face velocity		3.106	3.106	3.106	3.273	3.273	3.273	m/s
Nominal external pressure ($\Delta p_{s, ext}$)	Supply air	0			0			Pa
	Extract air	–			–			
Internal pressure drop of ventilation components ($\Delta p_{s, int}$)	Fresh air/supply air	–			–			Pa
	Extract air/exhaust air	–			–			
Static efficiency of the fans (η_{fan}) in accordance with Regulation (EU) No 327/2011		69.0			63.6			%
Maximum leakage rate	External	≤ 1			≤ 1			%
	Internal	–			–			
Energy classification of the filters	Supply air ePM ₁ 55 %	D			D			–
	Extract air	–			–			
Visual filter warning		Displayed on the operating unit						–
Casing sound power level (L_{WA})		69			71			dB(A)
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 E13: Product information according to Commission Regulation (EU) 1253/2014, Article 4(2)

4 Specification texts

4.1 TopVent® SH

Supply air unit for ventilating and heating rooms up to 25 m in height with central heat supply; configured as roof unit; equipped with highly efficient air distributor; maximum floor area reached per unit 537 m² (size 6) and 946 m² respectively (size 9). The unit consists of the following components:

- Roof unit (with access to all components relevant for maintenance)
- Below-roof unit, consisting of:
 - Connection module
 - Air-Injector
- Optional components

The TopVent® SH 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.

Roof unit

Self-supporting casing, construction made of thermally decoupled aluminium profile frame system with nylon connecting elements and panels made of magnesium-zinc sheet, additional rain canopy made of aluminium:

- 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 includes:

Fan

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

Heating section

The heating section contains:

- The highly efficient heating coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the hot water supply
- Frost controller

Fresh air filter

Pleated cell filter of filter class ePM₁ 55% according to ISO 16890, consisting of micro glass with synthetic lamination as handle protection, pleat pack completely encapsulated to prevent leakage, frame made of recycled plastic, fully incinerable, including differential pressure switch for filter monitoring.

Extract air filter

Pleated cell filter of filter class ePM₁ 55% according to ISO 16890, consisting of micro glass with synthetic lamination as handle protection, pleat pack completely encapsulated to prevent leakage, frame made of recycled plastic, fully incinerable, including differential pressure switch for filter monitoring.

Fresh air damper

Damper consisting of sheet steel blades with sealing lip and plastic gearwheels; tightness class 4 according to EN 1751; including actuator with shut-off function by spring return.

Recirculation damper

Damper consisting of sheet steel blades with plastic gearwheels; tightness class 2 according to EN 1751; including actuator.

Unit control box

Control box for connection of the power supply and housing the control components that facilitate energy-optimised operation, controlled by the control system TopTronic® C. Plastic casing, protection rating IP 56. The following components are installed:

- Circuit board with all required electrical components, unit controller (clipped on) as well as connection terminals for all internal and the following external connections:
 - Heating valve
 - Heating pump
 - Forced off

The circuit board is fitted with push-in terminals facilitating easy installation of the connection cables. All components in the unit control box as well as sensors, actuators in the unit and the isolation switch attached to the outside of the unit are fully factory-wired.

Power supply, bus connection, connection to Air-Injector actuator to be installed on site

Access openings

Defined side walls of the roof unit configured as inspection doors for easy access to all components relevant for maintenance. The hinges allow opening with an opening angle of 90° or complete removal of the inspection doors.

Below-roof unit

Connection module V1

Housing made of magnesium zinc sheet, air-tight, flame retardant, with highly efficient insulation made of expanded polystyrene, hygienic and easy to maintain because of smooth interior surfaces and ageing-resistant, silicone-free sealing materials; configured with:

- Extract air grille
- Cable feedthroughs for the electric supply
- Pipe feedthroughs for the hydraulic supply

Installation and insulation of the pipelines on site

Connection module V2 / V3 (variant)

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

Design with Air-Injector

Housing made of magnesium zinc sheet, air-tight, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored Polycell, 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

Actuator installed in the connection module for easy access from the roof.

Design without Air-Injector (variant)

Unit configured without vortex air distributor for connection to an on-site supply air duct and air distribution within the building.

Air distribution box (variant)

Housing made of magnesium zinc sheet, air-tight, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, insulated on the inside with close-pored Polycell; configured with 2 collars as connecting piece to the on-site air distribution system.

Options for the unit

Coating of roof unit

Side walls of the roof unit made of coated zinc sheet (anthracite grey, similar to RAL 7016).

Paint finish of below-roof unit

Exterior painting of the below-roof unit in choice of RAL colour.

Supply air silencer

Designed as a sound-absorbing mat made of rock wool; hygienically perfect with high-quality glass silk cover; mounted in the roof unit; insertion loss 3 dB.

Hydraulic assembly throttling circuit

Assembly for hydraulic throttling circuit, sized for the coil in the unit and the Hoval TopTronic® C, consisting of:

- Control valve with volume flow presetting, ball valve and automatic air vent, installed and wired in the roof unit
- Pre-insulated corrugated pipelines installed in the below-roof unit for connection to the distribution network

Pipelines in the roof unit and in the below-roof unit to be connected on site, pipelines in the roof unit to be insulated on site

Pump control

Electrical components for controlling a mixing or injection circuit in the load circuit, factory-installed in the unit control box.

Roof frame

Consisting of 4 load-bearing side walls made of galvanised sheet steel with fastening rails for the roof foil, supplied loose with the matching connecting screws.

Assembly, insulation, integration in the roof structure on site.

Protection hood

Hood made of magnesium zinc sheet for protecting the fresh air inlet against wind and snow, supplied loose with the matching connecting screws.

Assembly and mounting to the roof unit on site.

Protection hood coated

Hood made of coated zinc sheet (anthracite grey, similar to RAL 7016) for protecting the fresh air inlet against wind and snow, supplied loose with the matching connecting screws.

Assembly and mounting to the roof unit on site.

4.2 TopTronic® C – System control

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

Zone allocation

Configured in advance for the customer at the factory:

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

System structure

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

Functions, standard

- Zone-based autonomous room control. Temperature and ventilation control separately adjustable for each zone
- Room temperature control via room-supply air cascade by means of energy-optimised double sequence control with priority circuit for energy recovery (supply and extract air handling units)
- Intelligent automatic heating to reach the desired room temperature at the switching time
- 5 adjustable room temperature set values per zone:
 - Cooling protection (lower setpoint in standby)
 - Overheating protection (upper setpoint in standby)
 - Room set value winter
 - Room set value summer
 - Night cooling set value (free cooling) (supply and extract air handling units, 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:
 - CO₂ 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 CO₂ or VOC
 - ST Standby

- Main operating modes of recirculated air units:
 - REC . Recirculation, infinitely variably adjustment
 - DES.. Destratification
 - ST Standby

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

Operation

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

Options for operation

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

Alarms, protection

- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms; forwarding via e-mail can be set in the parameters.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.
- Pre-programmed data points retrievable via logger function for 1 year

Options for the zone control panel

- Alarm lamp
- Socket

Per zone:

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

Power distribution

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

4.3 TopTronic® C – System control for TopVent® C-SYS

Control system for the energy-optimised operation of decentralised Hoval indoor climate systems. Maximum system size per system bus: 1 control zone with up to 6 supply air handling units and 10 recirculation air handling 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:
 - Operating panel
 - Zone controller
 - Fresh air temperature sensor
 - 1 Room temperature sensor (expandable to up to 4 room temperature sensors)
 - Safety relay
 - Electrical cabinet internally pre-wired
- 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
- 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 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 CO₂ or VOC
 - ST Standby
- Main operating modes of recirculated air units:
 - REC . Recirculation, infinitely variably adjustment
 - DES.. Destratification
 - ST Standby
- Forced heating (construction site heating) can be activated on each device before completion of the overall system (activation by Hoval service technician)
- Control of draught-free air distribution with the Hoval Air-Injector: the discharge direction is adjusted infinitely variably and automatically according to the respective operating condition and the existing temperatures (heating/cooling).

Operation

- Operating panel with LCD display, installed in the door of the zone control panel for visualisation and control of all Hoval indoor climate units registered on the bus

Options for operation

- 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



TopVent® SC

Supply air unit configured as roof unit for ventilating, heating and cooling spaces up to 25 m in height with central heat and cold supply (2-pipe-system)

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2 Construction and operation	66
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1 Use

1.1 Intended use

TopVent® SC is a supply air unit for ventilating, heating and cooling spaces up to 25 m in height with central heat and cold supply. It fulfils the following functions:

- Heating (with connection to a hot water supply)
- Cooling (with connection to a water chiller)
- Fresh air supply
- Mixed air operation
- Recirculation operation
- Air distribution and destratification with adjustable Air-Injector
- Air filtration

TopVent® SC is configured as a roof unit. It is installed in the roof to save space and does not protrude far into the room. Maintenance work is carried out from the roof without causing disruption to operations in the building.

The TopVent® SC 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.

The Hoval TopTronic® C integrated control system ensures energy-efficient, demand-based operation of Hoval indoor climate systems.

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

1.2 User group

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

2 Construction and operation

2.1 Construction

The TopVent® SC unit consists of the following components:

Roof unit

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 following components:

- Fan
 - Heating/cooling section
 - Coil for heating and cooling the supply air with hot water or cold water
 - Condensate separator
 - Fresh air and extract air filters
 - Control dampers
 - Unit control box (part of the TopTronic® C control system)
- 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:

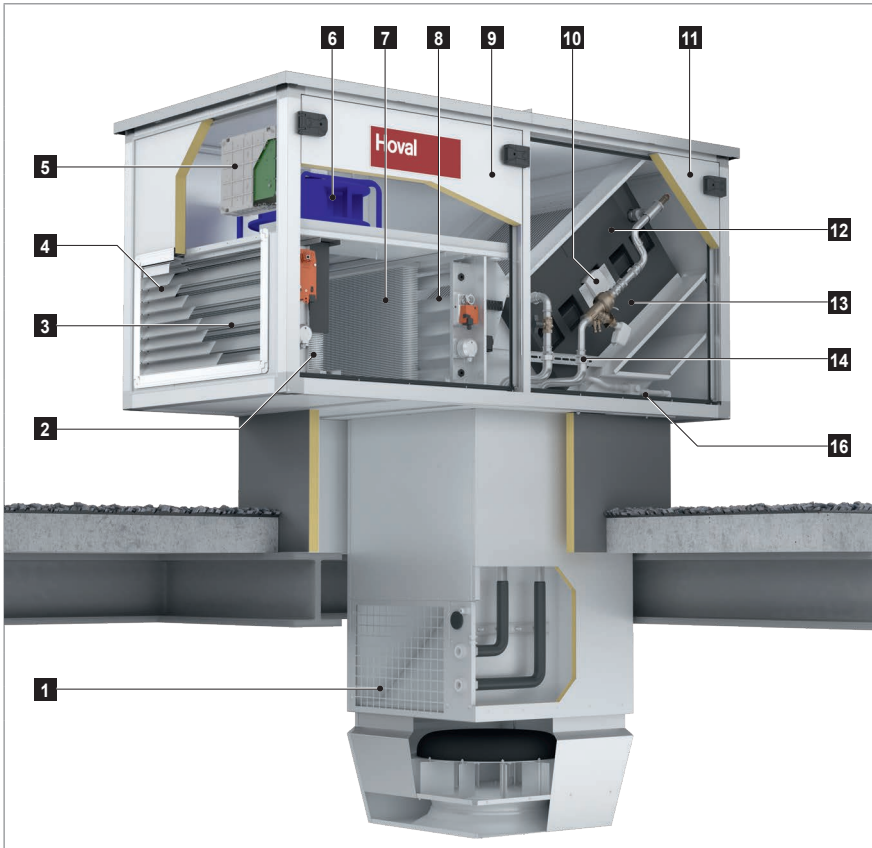
The connection module serves as an air duct through the roof and for drawing in extract air from the hall through the extract air grille. To enable easy adaptation to local installation conditions, the connection module is available in 3 lengths.
- Air-Injector:

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.



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

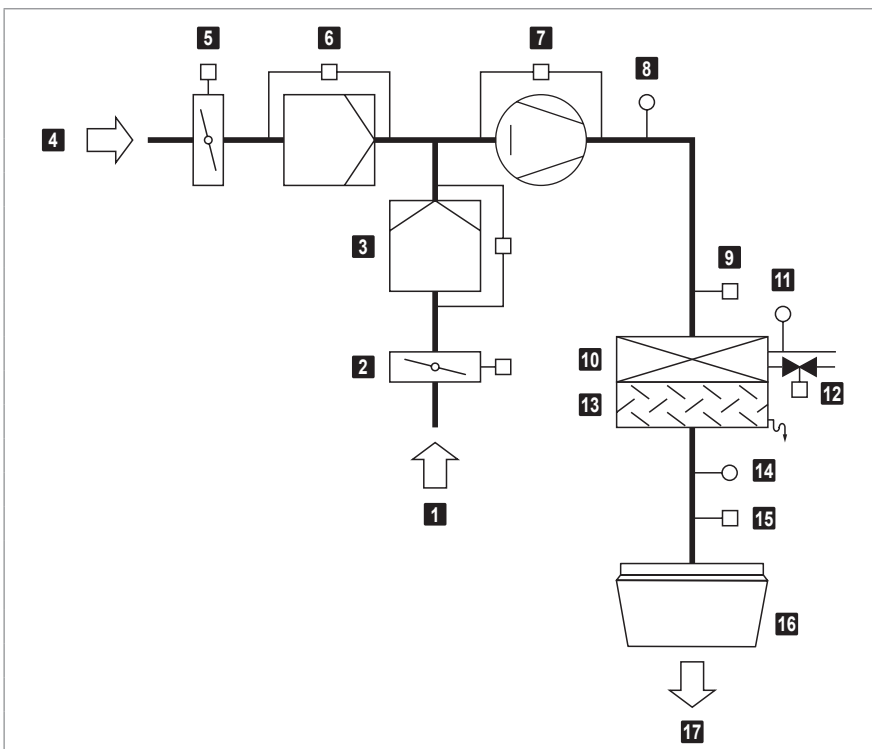
Fig. F1: TopVent® SC components



- 1 Extract air grille
- 2 Fresh air filter
- 3 Fresh air damper
- 4 Weather protection
- 5 Unit control box
- 6 Fan
- 7 Extract air filter
- 8 Recirculation damper
- 9 Fan access door
- 10 Frost controller
- 11 Hydraulic connection access door
- 12 Heating/cooling coil
- 13 Condensate separator
- 14 Hydraulic assembly throttling circuit
- 15 Condensate drain

Fig. F2: TopVent® SC construction

2.2 Function diagram



- 1 Extract air
- 2 Recirculation damper with actuator
- 3 Extract air filter with differential pressure switch
- 4 Fresh air
- 5 Fresh air damper with actuator
- 6 Fresh air filter with differential pressure switch
- 7 Fan with flow rate monitoring
- 8 Mixed air temperature sensor
- 9 Frost controller
- 10 Heating/cooling coil
- 11 Return temperature sensor
- 12 Control valve with actuator (option)
- 13 Condensate separator
- 14 Supply air temperature sensor
- 15 Actuator Air-Injector
- 16 Air-Injector
- 17 Supply air

Fig. F3: TopVent® SC function diagram

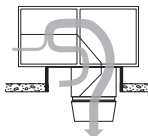

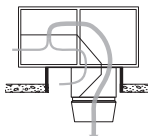
2.3 Operating modes

TopVent® SC operates in the following modes:

- Supply air speed 2
- Supply air speed 1
- 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® SC unit can operate individually in a local operating mode: Off, Supply air speed 2, Supply air speed 1, Recirculation, Recirculation speed 1.

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> <ul style="list-style-type: none"> ■ 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. <ul style="list-style-type: none"> – 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 CO₂ or VOC content of the room air is reached, the fresh air damper closes again to the set minimum value. 		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
 Notice In order to save heating energy, the unit only operates with the set minimum fresh air rate when heat is required.			
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)

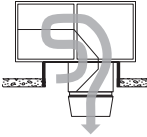
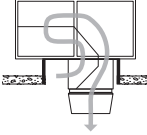
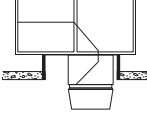
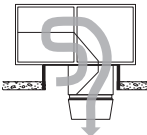
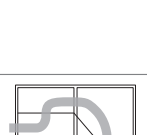
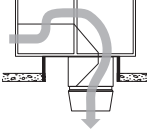
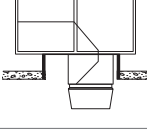
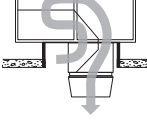
Code	Operating mode		Description
REC	Recirculation On/Off operation: during heat or cool demand, the unit draws in room air, heats or cools it and blows it back into the room. The room temperature set value day is active.		Fan speed 1/2 ¹⁾ Fresh air damper..... closed Heating/cooling on ¹⁾ ¹⁾ Depending on heat or cool demand
DES	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ Overheating protection: If the room temperature rises above the set value for overheating protection, the unit cools down the room in recirculation operation. 		Fan speed 2 Fresh air damper..... closed Cooling..... on
NCS	<ul style="list-style-type: none"> ■ 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
-	Forced heating The unit draws in room air, warms it and blows it back into the room. Forced heating can be activated and set as required by the Hoval service technician. For example, it is suitable for heating the hall before taking the control system into operation or if the controller fails during the heating period.		Fan speed 2 ¹⁾ Fresh air damper..... closed ¹⁾ Heating on ¹⁾ ¹⁾ Adjustable by the Hoval service technician

Table F1: TopVent® SC operating modes

3 Technical data

3.1 Type code

SC - 6 - C ...	
Unit type	TopVent® SC
Unit size	6 or 9
Heating/cooling section	C with coil type C D with coil type D
Further options	

Table F2: TopVent® SC type code

3.2 Application limits

Extract air temperature	max.	°C	45
Extract air relative humidity	max.	%	60
Moisture content of extract air	max.	g/kg	15
Fresh air temperature	min.	°C	-20
	max.	°C	45
Supply air temperature	max.	°C	60
Temperature of the heating medium	max.	°C	90
Pressure of the heating medium	max.	kPa	800
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			
■ Places with a corrosive or aggressive environment			
■ Spaces with a large amount of dust			
■ Areas where there is danger of explosion			

Table F3: TopVent® SC application limits

3.3 Electrical connection

Unit type		SC-6	SC-9
Supply voltage	V AC	3 x 400	3 x 400
Permitted voltage tolerance	%	± 5	± 5
Frequency	Hz	50	50
Connected load	kW	2.23	3.33
Current consumption max.	A	4.17	5.87
Series fuse	A	13	13
Protection rating	-	IP 54	IP 54

Table F4: TopVent® SC electrical connections

3.4 Air flow rate

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

Table F5: TopVent® SC air flow rate

3.5 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 F6: TopVent® SC air filtration

3.6 Sound level

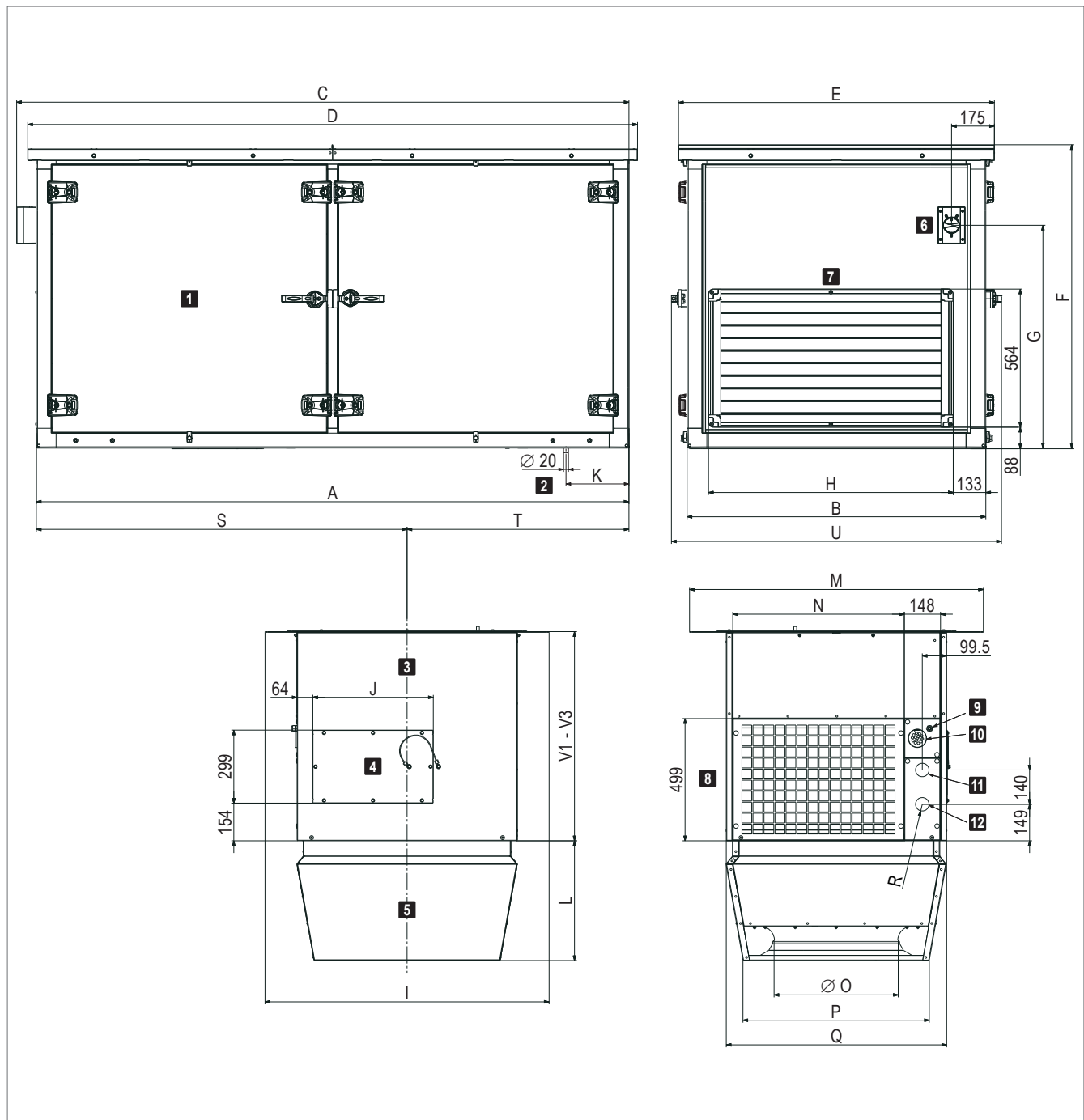
Unit type		dB(A)	SC-6-C		SC-9-C	
			indoors	outdoors ¹⁾	indoors	outdoors ¹⁾
Sound pressure level (at a dist. of 5 m) ²⁾			55	47	59	50
Total sound power level			77	69	81	72
Octave sound power level	63 Hz	dB	45	44	47	45
	125 Hz	dB	61	55	65	58
	250 Hz	dB	67	63	70	64
	500 Hz	dB	71	65	73	66
	1000 Hz	dB	74	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 fresh air ratio 10 %

²⁾ with a hemispherical radiation pattern in a low-reflection room

Table F7: TopVent® SC sound level

3.9 Dimensions and weights



1 Roof unit	7 Weather protection
2 Condensate drain	8 Extract air grille
3 Connection module	9 Cable gland for power supply
4 Installation lid	10 Cable feedthrough for signal cables
5 Air-Injector	11 Heating/cooling circuit return
6 Isolation switch	12 Heating/cooling circuit flow

Table F10: Dimensional drawing for TopVent® SC with hydraulic assembly throttling circuit (dimensions in mm)

Unit type		SC-6	SC-9
A	mm	2420	2725
B	mm	1220	1420
C	mm	2500	2805
D	mm	2490	2795
E	mm	1290	1490
F	mm	1239	1439
G	mm	910	1010
H	mm	999	1199
I	mm	1160	1360
J	mm	492	492
K	mm	257	292
L	mm	490	570
M	mm	1200	1400
N	mm	701	901
Ø O	mm	500	630
P	mm	767	937
Q	mm	900	1100
R (internal thread) ¹⁾	"	G 1½	G 1½
S	mm	1514	1684
T	mm	906	1041
U	mm	1348	1548
V1	mm	850	850
V2	mm	1300	1300
V3	mm	1750	1750

¹⁾ TopVent® units without hydraulic assembly: pipe outlets Ø 55 mm

Table F11: TopVent® SC dimensions

Unit type	SC-	6-C	9-C	9-D
Total	kg	692	879	898
Roof unit	kg	550	697	716
Below-roof unit	kg	142	182	182
Air-Injector	kg	40	57	57
Connection module V1	kg	102	125	
Additional weight V2	kg	+ 42	+ 50	
Additional weight V3	kg	+ 85	+ 101	

Table F12: TopVent® SC weights

Heating/cooling section		6-C	9-C	9-D
Connection (internal thread)	"	Rp 1¼	Rp 1½	Rp 2
Water content of the coil	l	7.9	12.4	19.2

Table F13: Hydraulic connection of the heating/cooling section in the roof unit (without hydraulic assembly throttling circuit)

3.10 Product information according to ErP

Trademark / Model		Hoval TopVent® SC			Unit
		6-C	9-C	9-D	
Type		NRVU, BVU			–
Drive		Variable speed drive			–
Heat recovery system		none			–
Thermal efficiency of heat recovery (η_{t_nrvu})		–			%
Nominal flow rate (q_{nom})		1.67	2.50	2.50	m³/s
Effective electric power input (P)		1.10	1.94	2.09	kW
Internal specific fan power (SFP _{int})		162	65	65	W/(m³/s)
Face velocity		3.106	3.273	3.273	m/s
Nominal external pressure ($\Delta p_{s, ext}$)	Supply air	0	0		Pa
	Extract air	–	–		
Internal pressure drop of ventilation components ($\Delta p_{s, int}$)	Fresh air/supply air	–	–		Pa
	Extract air/exhaust air	–	–		
Static efficiency of the fans (η_{fan}) in accordance with Regulation (EU) No 327/2011		69.0	63.6		%
Maximum leakage rate	External	≤ 1	≤ 1		%
	Internal	–	–		
Energy classification of the filters	Supply air ePM ₁ 55 %	D	D		–
	Extract air	–	–		
Visual filter warning		Displayed on the operating unit			–
Casing sound power level (L _{WA})		69	72		dB(A)
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 F14: Product information according to Commission Regulation (EU) 1253/2014, Article 4(2)

4 Specification texts

4.1 TopVent® SC

Supply air unit for ventilating, heating and cooling rooms up to 25 m in height with central heat and cold supply (2-pipe system); configured as roof unit; equipped with highly efficient air distributor; maximum floor area reached per unit 537 m² (size 6) and 946 m² respectively (size 9). The unit consists of the following components:

- Roof unit (with access to all components relevant for maintenance)
- Below-roof unit, consisting of:
 - Connection module
 - Air-Injector
- Optional components

The TopVent® SC 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.

Roof unit

Self-supporting casing, construction made of thermally decoupled aluminium profile frame system with nylon connecting elements and panels made of magnesium-zinc sheet, additional rain canopy made of aluminium:

- 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 includes:

Fan

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

Heating/cooling section

The heating/cooling section contains:

- The highly efficient heating/cooling coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the hot water and cold water supply

- The pull-out condensate separator with collecting channel, made of high-quality corrosion-resistant material, with a downslope in all directions for rapid draining
- Frost controller
- the condensate drain on the roof via siphon

Fresh air filter

Pleated cell filter of filter class ePM₁ 55% according to ISO 16890, consisting of micro glass with synthetic lamination as handle protection, pleat pack completely encapsulated to prevent leakage, frame made of recycled plastic, fully incinerable, including differential pressure switch for filter monitoring.

Extract air filter

Pleated cell filter of filter class ePM₁ 55% according to ISO 16890, consisting of micro glass with synthetic lamination as handle protection, pleat pack completely encapsulated to prevent leakage, frame made of recycled plastic, fully incinerable, including differential pressure switch for filter monitoring.

Fresh air damper

Damper consisting of sheet steel blades with sealing lip and plastic gearwheels; tightness class 4 according to EN 1751; including actuator with shut-off function by spring return.

Recirculation damper

Damper consisting of sheet steel blades with plastic gearwheels; tightness class 2 according to EN 1751; including actuator.

Unit control box

Control box for connection of the power supply and housing the control components that facilitate energy-optimised operation, controlled by the control system TopTronic® C. Plastic casing, protection rating IP 56. The following components are installed:

- Circuit board with all required electrical components, unit controller (clipped on) as well as connection terminals for all internal and the following external connections:
 - Heating/cooling valve
 - Heating/cooling pump
 - Forced off

The circuit board is fitted with push-in terminals facilitating easy installation of the connection cables. All components in the unit control box as well as sensors, actuators in the unit and the isolation switch attached to the outside of the unit are fully factory-wired.

Power supply, bus connection, connection to Air-Injector actuator to be installed on site

Access openings

Defined side walls of the roof unit configured as inspection doors for easy access to all components relevant for maintenance. The hinges allow opening with an opening angle of 90° or complete removal of the inspection doors.

Below-roof unit

Connection module V1

Housing made of magnesium zinc sheet, air-tight, flame retardant, with highly efficient insulation made of expanded polystyrene, hygienic and easy to maintain because of smooth interior surfaces and ageing-resistant, silicone-free sealing materials; configured with:

- Extract air grille
 - Cable feedthroughs for the electric supply
 - Pipe feedthroughs for the hydraulic supply
- Installation and insulation of the pipelines on site

Connection module V2 / V3 (variant)

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

Design with Air-Injector

Housing made of magnesium zinc sheet, air-tight, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored Polycell, 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

Actuator installed in the connection module for easy access from the roof.

Design without Air-Injector (variant)

Unit configured without vortex air distributor for connection to an on-site supply air duct and air distribution within the building.

Air distribution box (variant)

Housing made of magnesium zinc sheet, air-tight, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, insulated on the inside with close-pored Polycell; configured with 2 collars as connecting piece to the on-site air distribution system.

Options for the unit

Coating of roof unit

Side walls of the roof unit made of coated zinc sheet (anthracite grey, similar to RAL 7016).

Paint finish of below-roof unit

Exterior painting of the below-roof unit in choice of RAL colour.

Supply air silencer

Designed as a sound-absorbing mat made of rock wool; hygienically perfect with high-quality glass silk cover; mounted in the roof unit; insertion loss 3 dB.

Hydraulic assembly throttling circuit

Assembly for hydraulic throttling circuit, sized for the coil in the unit and the Hoval TopTronic® C, consisting of:

- Control valve with volume flow presetting, ball valve and automatic air vent, installed and wired in the roof unit
- Pre-insulated corrugated pipelines installed in the below-

roof unit for connection to the distribution network
Pipelines in the roof unit and in the below-roof unit to be connected on site, pipelines in the roof unit to be insulated on site

Pump control

Electrical components for controlling a mixing or injection circuit in the load circuit, factory-installed in the unit control box.

Roof frame

Consisting of 4 load-bearing side walls made of galvanised sheet steel with fastening rails for the roof foil, supplied loose with the matching connecting screws.

Assembly, insulation, integration in the roof structure on site.

Protection hood

Hood made of magnesium zinc sheet for protecting the fresh air inlet against wind and snow, supplied loose with the matching connecting screws.

Assembly and mounting to the roof unit on site.

Protection hood coated

Hood made of coated zinc sheet (anthracite grey, similar to RAL 7016) for protecting the fresh air inlet against wind and snow, supplied loose with the matching connecting screws.

Assembly and mounting to the roof unit on site.

4.2 TopTronic® C – System control

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

Zone allocation

Configured in advance for the customer at the factory:

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

System structure

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

Functions, standard

- Zone-based autonomous room control. Temperature and ventilation control separately adjustable for each zone
- Room temperature control via room-supply air cascade by means of energy-optimised double sequence control with priority circuit for energy recovery (supply and extract air handling units)
- Intelligent automatic heating to reach the desired room temperature at the switching time
- 5 adjustable room temperature set values per zone:
 - Cooling protection (lower setpoint in standby)
 - Overheating protection (upper setpoint in standby)
 - Room set value winter
 - Room set value summer
 - Night cooling set value (free cooling) (supply and extract air handling units, 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:
 - CO₂ 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 CO₂ or VOC
 - ST Standby

- Main operating modes of recirculated air units:
 - REC . Recirculation, infinitely variably adjustment
 - DES.. Destratification
 - ST Standby

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

Operation

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

Options for operation

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

Alarms, protection

- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms; forwarding via e-mail can be set in the parameters.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.
- Pre-programmed data points retrievable via logger function for 1 year

Options for the zone control panel

- Alarm lamp
- Socket

Per zone:

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

Power distribution

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

4.3 TopTronic® C – System control for TopVent® C-SYS

Control system for the energy-optimised operation of decentralised Hoval indoor climate systems. Maximum system size per system bus: 1 control zone with up to 6 supply air handling units and 10 recirculation air handling 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:
 - Operating panel
 - Zone controller
 - Fresh air temperature sensor
 - 1 Room temperature sensor (expandable to up to 4 room temperature sensors)
 - Safety relay
 - Electrical cabinet internally pre-wired
- 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
- 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 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 CO₂ or VOC
 - ST Standby
- Main operating modes of recirculated air units:
 - REC . Recirculation, infinitely variably adjustment
 - DES.. Destratification
 - ST Standby
- Forced heating (construction site heating) can be activated on each device before completion of the overall system (activation by Hoval service technician)
- Control of draught-free air distribution with the Hoval Air-Injector: the discharge direction is adjusted infinitely variably and automatically according to the respective operating condition and the existing temperatures (heating/cooling).

Operation

- Operating panel with LCD display, installed in the door of the zone control panel for visualisation and control of all Hoval indoor climate units registered on the bus

Options for operation

- 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



TopVent® SHC

Supply air unit configured as roof unit for ventilating, heating and cooling spaces up to 25 m in height with central heat and cold supply (4-pipe-system)

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1 Use

1.1 Intended use

TopVent® SHC is a supply air unit for ventilating, heating and cooling spaces up to 25 m in height with central heat and cold supply. It fulfils the following functions:

- Heating (with connection to a hot water supply)
- Cooling (with connection to a water chiller)
- Fresh air supply
- Mixed air operation
- Recirculation operation
- Air distribution and destratification with adjustable Air-Injector
- Air filtration

TopVent® SHC is configured as a roof unit. It is installed in the roof to save space and does not protrude far into the room. Maintenance work is carried out from the roof without causing disruption to operations in the building.

The TopVent® SHC 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.

The Hoval TopTronic® C integrated control system ensures energy-efficient, demand-based operation of Hoval indoor climate systems.

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

1.2 User group

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

2 Construction and operation

2.1 Construction

The TopVent® SHC unit consists of the following components:

Roof unit

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 following components:

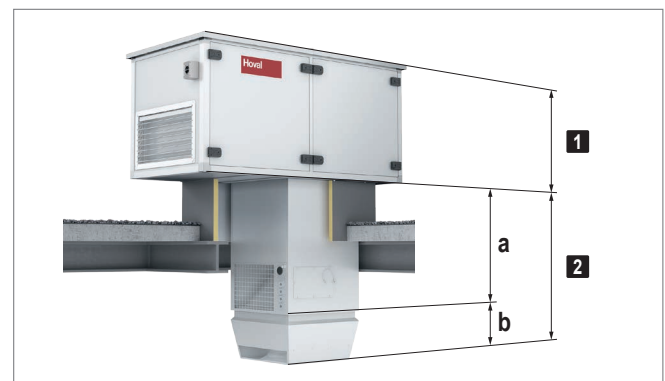
- Fan
- Heating section
 - Coil for heating the supply air with hot water
- Cooling section
 - Coil for cooling the supply air with cold water
 - Condensate separator
- Fresh air and extract air filters
- Control dampers
- Unit control box (part of the TopTronic® C control system)

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

Below-roof unit

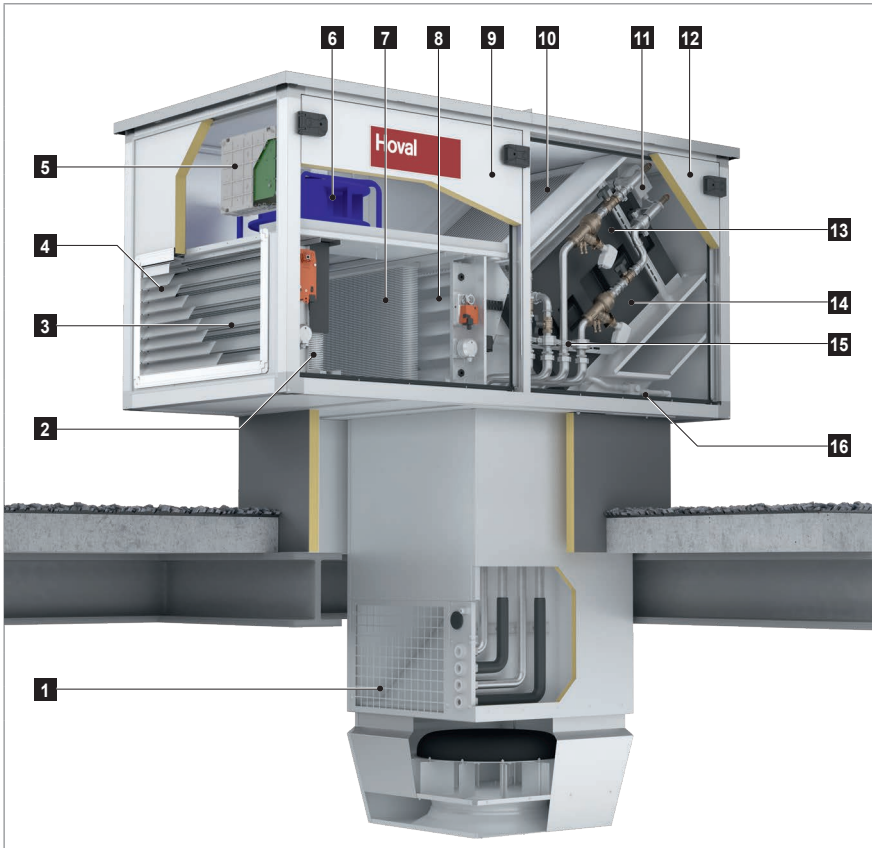
The below-roof unit comprises the following components:

- 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 3 lengths.
- 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.



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

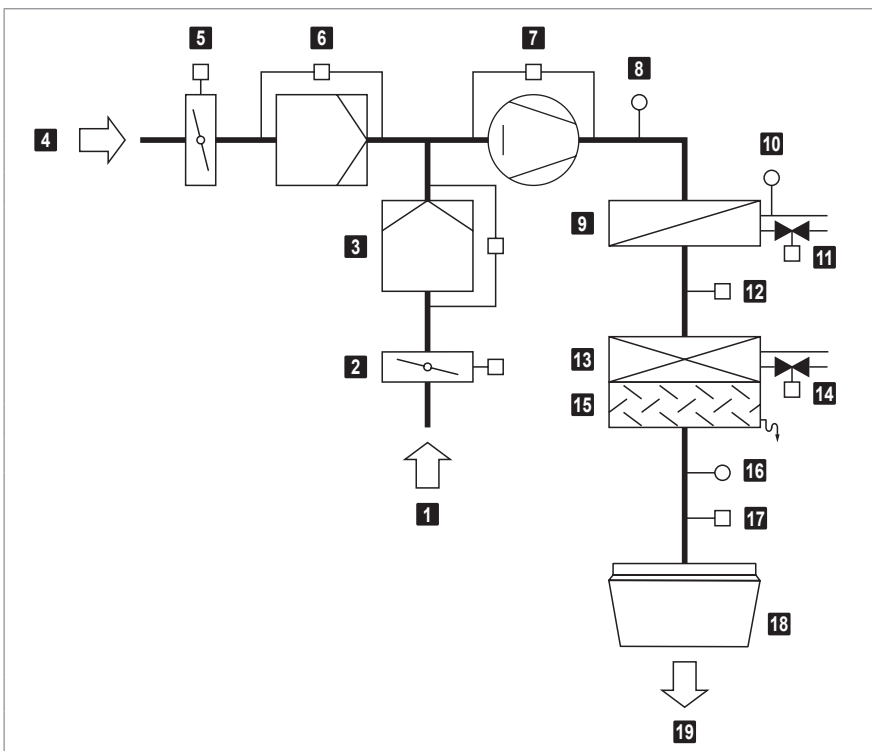
Fig. G1: TopVent® SHC components



- 1 Extract air grille
- 2 Fresh air filter
- 3 Fresh air damper
- 4 Weather protection
- 5 Unit control box
- 6 Fan
- 7 Extract air filter
- 8 Recirculation damper
- 9 Fan access door
- 10 Heating coil
- 11 Frost controller
- 12 Hydraulic connection access door
- 13 Cooling coil
- 14 Condensate separator
- 15 Hydraulic assembly throttling circuit
- 16 Condensate drain

Fig. G2: TopVent® SHC construction

2.2 Function diagram



- 1 Extract air
- 2 Recirculation damper with actuator
- 3 Extract air filter with differential pressure switch
- 4 Fresh air
- 5 Fresh air damper with actuator
- 6 Fresh air filter with differential pressure switch
- 7 Fan with flow rate monitoring
- 8 Mixed air temperature sensor
- 9 Heating coil
- 10 Return temperature sensor
- 11 Control valve with actuator (option)
- 12 Frost controller
- 13 Cooling coil
- 14 Control valve with actuator (option)
- 15 Condensate separator
- 16 Supply air temperature sensor
- 17 Actuator Air-Injector
- 18 Air-Injector
- 19 Supply air

Fig. G3: TopVent® SHC function diagram

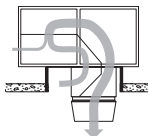

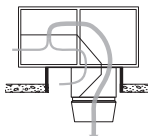
2.3 Operating modes

TopVent® SHC operates in the following modes:

- Supply air speed 2
- Supply air speed 1
- 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® SHC unit can operate individually in a local operating mode: Off, Supply air speed 2, Supply air speed 1, Recirculation, Recirculation speed 1.

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> <ul style="list-style-type: none"> ■ 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. <ul style="list-style-type: none"> – 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 CO₂ or VOC content of the room air is reached, the fresh air damper closes again to the set minimum value. 		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
 Notice In order to save heating energy, the unit only operates with the set minimum fresh air rate when heat is required.			
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)

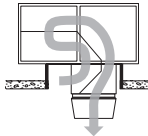
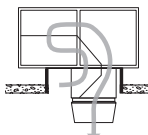
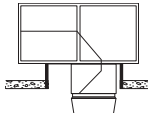
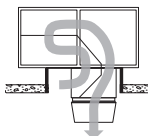
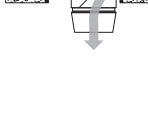
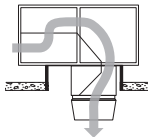
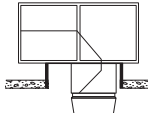
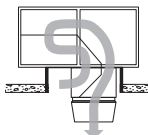
Code	Operating mode		Description
REC	Recirculation On/Off operation: during heat or cool demand, the unit draws in room air, heats or cools it and blows it back into the room. The room temperature set value day is active.		Fan speed 1/2 ¹⁾ Fresh air damper..... closed Heating/cooling on ¹⁾ ¹⁾ Depending on heat or cool demand
DES	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ Overheating protection: If the room temperature rises above the set value for overheating protection, the unit cools down the room in recirculation operation. 		Fan speed 2 Fresh air damper..... closed Cooling..... on
NCS	<ul style="list-style-type: none"> ■ 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
–	Forced heating The unit draws in room air, warms it and blows it back into the room. Forced heating can be activated and set as required by the Hoval service technician. For example, it is suitable for heating the hall before taking the control system into operation or if the controller fails during the heating period.		Fan speed 2 ¹⁾ Fresh air damper..... closed ¹⁾ Heating on ¹⁾ ¹⁾ Adjustable by the Hoval service technician

Table G1: TopVent® SHC operating modes

3 Technical data

3.1 Type code

	SHC - 6 B C ...
Unit type	TopVent® SHC
Unit size	6 or 9
Heating section	A with coil type A B with coil type B C with coil type C
Cooling section	C with coil type C D with coil type D
Further options	

Table G2: TopVent® SHC type code

3.2 Application limits

Extract air temperature	max.	°C	45
Moisture content of extract air	max.	g/kg	15
Fresh air temperature	min.	°C	-20
	max.	°C	45
Supply air temperature	max.	°C	60
Temperature of the heating medium	max.	°C	90
Pressure of the heating medium	max.	kPa	800
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			
■ Places with a corrosive or aggressive environment			
■ Spaces with a large amount of dust			
■ Areas where there is danger of explosion			

Table G3: TopVent® SHC application limits

3.3 Electrical connection

Unit type		SHC-6	SHC-9
Supply voltage	V AC	3 x 400	3 x 400
Permitted voltage tolerance	%	± 5	± 5
Frequency	Hz	50	50
Connected load	kW	2.43	3.53
Current consumption max.	A	4.17	5.87
Series fuse	A	13	13
Protection rating	-	IP 54	IP 54

Table G4: TopVent® SHC electrical connections

3.4 Air flow rate

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

Table G5: TopVent® SHC air flow rate

3.5 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 G6: TopVent® SHC air filtration

3.6 Sound level

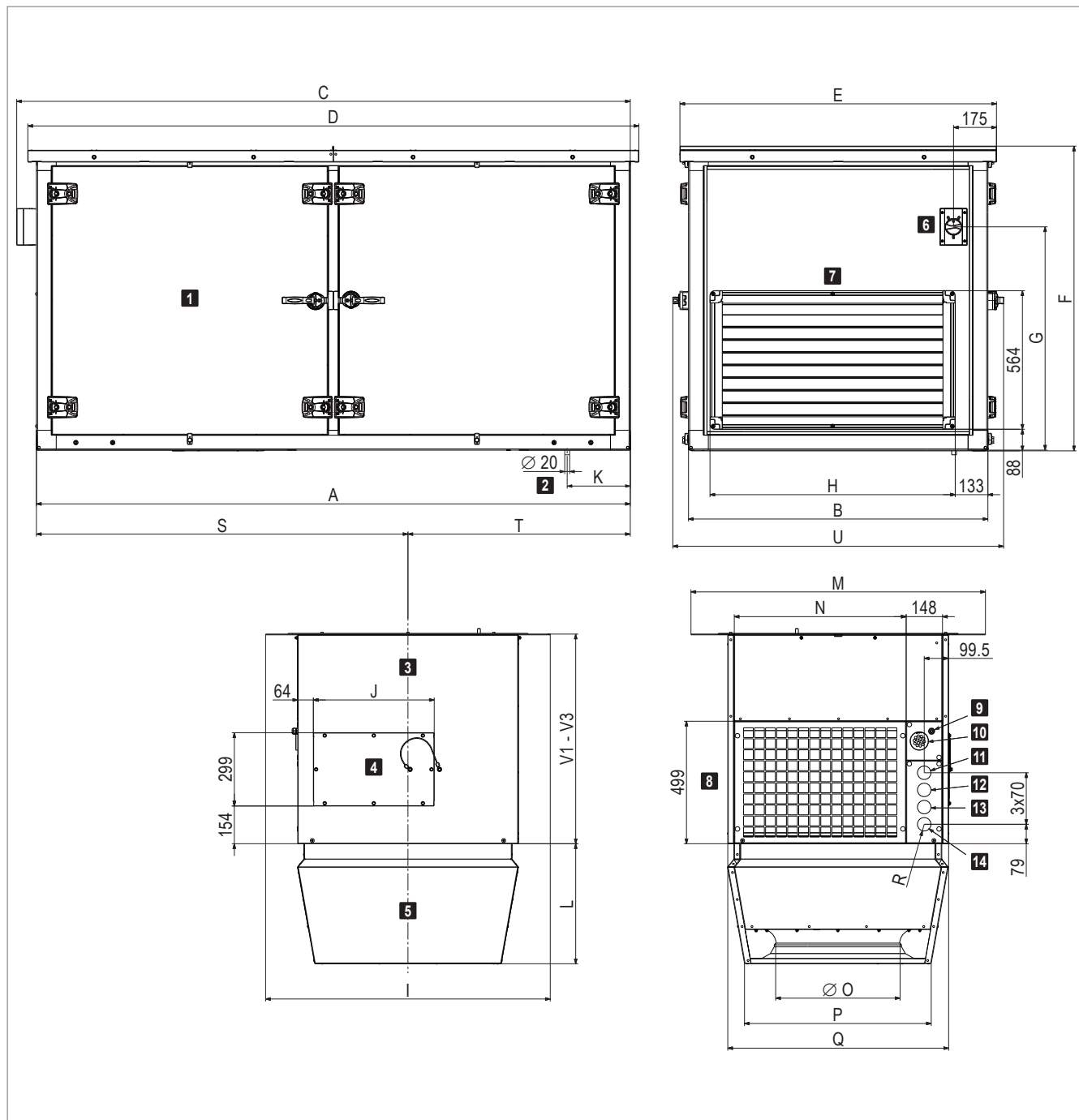
Unit type			SHC-6CC		SHC-9CC	
			indoors	outdoors ¹⁾	indoors	outdoors ¹⁾
Sound pressure level (at a dist. of 5 m) ²⁾		dB(A)	55	48	59	50
Total sound power level		dB(A)	77	70	81	72
Octave sound power level	63 Hz	dB	45	45	47	46
	125 Hz	dB	58	55	60	55
	250 Hz	dB	67	64	70	65
	500 Hz	dB	71	66	73	67
	1000 Hz	dB	73	60	77	66
	2000 Hz	dB	69	59	75	66
	4000 Hz	dB	64	56	70	62
	8000 Hz	dB	63	57	65	58

¹⁾ with fresh air ratio 10 %

²⁾ with a hemispherical radiation pattern in a low-reflection room

Table G7: TopVent® SHC sound level

3.9 Dimensions and weights



1 Roof unit	8 Extract air grille
2 Condensate drain	9 Cable gland for power supply
3 Connection module	10 Cable feedthrough for signal cables
4 Installation lid	11 Heating circuit return
5 Air-Injector	12 Cooling circuit return
6 Isolation switch	13 Heating circuit flow
7 Weather protection	14 Cooling circuit flow

Table G10: Dimensional drawing for TopVent® SHC with hydraulic assembly throttling circuit (dimensions in mm)

Unit type		SHC-6	SHC-9
A	mm	2420	2725
B	mm	1220	1420
C	mm	2500	2805
D	mm	2490	2795
E	mm	1290	1490
F	mm	1239	1439
G	mm	910	1010
H	mm	999	1199
I	mm	1160	1360
J	mm	492	492
K	mm	257	292
L	mm	490	570
M	mm	1200	1400
N	mm	701	901
Ø O	mm	500	630
P	mm	767	937
Q	mm	900	1100
R (internal thread) ¹⁾	"	G 1½	G 1½
S	mm	1514	1684
T	mm	906	1041
U	mm	1348	1548
V1	mm	850	850
V2	mm	1300	1300
V3	mm	1750	1750

¹⁾ TopVent® units without hydraulic assembly: pipe outlets Ø 55 mm

Table G11: TopVent® SHC dimensions

Unit type	SHC-	6AC	6BC	6CC	9AC	9BC	9CC	9AD	9BD	9CD
Total	kg	723	722	729	922	921	934	941	940	953
Roof unit	kg	581	580	587	740	739	752	759	758	771
Below-roof unit	kg	142	142	142	182	182	182	182	182	182
Air-Injector	kg	40	40	40	57	57	57	57	57	57
Connection module V1	kg	102			125					
Additional weight V2	kg	+ 42			+ 50					
Additional weight V3	kg	+ 85			+ 101					

Table G12: TopVent® SHC weights

Heating section		6 A	6B	6C	9 A	9B	9C
Connection (internal thread)	"	Rp 1¼	Rp 1¼	Rp 1¼	Rp 1½	Rp 1½	Rp 1½
Water content of the coil	l	4.6	4.6	7.9	7.4	7.4	12.4

Table G13: Hydraulic connection of the heating section in the roof unit (without hydraulic assembly throttling circuit)

Cooling section		6-C	9-C	9-D
Connection (internal thread)	"	Rp 1¼	Rp 1½	Rp 2
Water content of the coil	l	7.9	12.4	19.2

Table G14: Hydraulic connection of the cooling section in the roof unit (without hydraulic assembly throttling circuit)

3.10 Product information according to ErP

Trademark / Model		Hoval TopVent® SHC								Unit	
		6AC	6BC	6CC	9AC	9BC	9CC	9AD	9BD		9CD
Type		NRVU, BVU								-	
Drive		Variable speed drive								-	
Heat recovery system		none								-	
Thermal efficiency of heat recovery (η_{t_nrvu})		-								%	
Nominal flow rate (q_{nom})		1.67	1.67	1.67	2.50	2.50	2.50	2.50	2.50	2.50	m³/s
Effective electric power input (P)		1.16	1.20	1.29	2.05	2.12	2.27	2.20	2.27	2.42	kW
Internal specific fan power (SFP_{int})		162	162	162	65	65	65	65	65	65	W/(m³/s)
Face velocity		3.106	3.106	3.106	3.273	3.273	3.273	3.273	3.273	3.273	m/s
Nominal external pressure ($\Delta p_{s, ext}$)	Supply air	0			0					Pa	
	Extract air	-			-						
Internal pressure drop of ventilation components ($\Delta p_{s, int}$)	Fresh air/supply air	-			-					Pa	
	Extract air/exhaust air	-			-						
Static efficiency of the fans (η_{fan}) in accordance with Regulation (EU) No 327/2011		69.0			63.6					%	
Maximum leakage rate	External	≤ 1			≤ 1					%	
	Internal	-			-						
Energy classification of the filters	Supply air ePM ₁ 55 %	D			D					-	
	Extract air	-			-						
Visual filter warning		Displayed on the operating unit								-	
Casing sound power level (L_{WA})		70			72					dB(A)	
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 G15: Product information according to Commission Regulation (EU) 1253/2014, Article 4(2)

4 Specification texts

4.1 TopVent® SHC

Supply air unit for ventilating, heating and cooling rooms up to 25 m in height with central heat and cold supply (4-pipe system); configured as roof unit; equipped with highly efficient air distributor; maximum floor area reached per unit 537 m² (size 6) and 946 m² respectively (size 9). The unit consists of the following components:

- Roof unit (with access to all components relevant for maintenance)
- Below-roof unit, consisting of:
 - Connection module
 - Air-Injector
- Optional components

The TopVent® SHC 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.

Roof unit

Self-supporting casing, construction made of thermally decoupled aluminium profile frame system with nylon connecting elements and panels made of magnesium-zinc sheet, additional rain canopy made of aluminium:

- 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 includes:

Fan

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

Heating section

The heating section contains:

- The highly efficient heating coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the hot water supply
- Frost controller

Cooling section

The cooling section contains:

- The highly efficient cooling coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the cold water supply
- 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 drain on the roof via siphon

Fresh air filter

Pleated cell filter of filter class ePM₁ 55% according to ISO 16890, consisting of micro glass with synthetic lamination as handle protection, pleat pack completely encapsulated to prevent leakage, frame made of recycled plastic, fully incinerable, including differential pressure switch for filter monitoring.

Extract air filter

Pleated cell filter of filter class ePM₁ 55% according to ISO 16890, consisting of micro glass with synthetic lamination as handle protection, pleat pack completely encapsulated to prevent leakage, frame made of recycled plastic, fully incinerable, including differential pressure switch for filter monitoring.

Fresh air damper

Damper consisting of sheet steel blades with sealing lip and plastic gearwheels; tightness class 4 according to EN 1751; including actuator with shut-off function by spring return.

Recirculation damper

Damper consisting of sheet steel blades with plastic gearwheels; tightness class 2 according to EN 1751; including actuator.

Unit control box

Control box for connection of the power supply and housing the control components that facilitate energy-optimised operation, controlled by the control system TopTronic® C. Plastic casing, protection rating IP 56. The following components are installed:

- Circuit board with all required electrical components, unit controller (clipped on) as well as connection terminals for all internal and the following external connections:
 - Heating and cooling valve
 - Heating and cooling pump
 - Forced off

The circuit board is fitted with push-in terminals facilitating easy installation of the connection cables. All components in the unit control box as well as sensors, actuators in the unit and the isolation switch attached to the outside of the unit are fully factory-wired.

Power supply, bus connection, connection to Air-Injector actuator to be installed on site

Access openings

Defined side walls of the roof unit configured as inspection doors for easy access to all components relevant for maintenance. The hinges allow opening with an opening angle of 90° or complete removal of the inspection doors.

Below-roof unit**Connection module V1**

Housing made of magnesium zinc sheet, air-tight, flame retardant, with highly efficient insulation made of expanded polystyrene, hygienic and easy to maintain because of smooth interior surfaces and ageing-resistant, silicone-free sealing materials; configured with:

- Extract air grille
 - Cable feedthroughs for the electric supply
 - Pipe feedthroughs for the hydraulic supply
- Installation and insulation of the pipelines on site

Connection module V2 / V3 (variant)

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

Design with Air-Injector

Housing made of magnesium zinc sheet, air-tight, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored Polycell, 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

Actuator installed in the connection module for easy access from the roof.

Design without Air-Injector (variant)

Unit configured without vortex air distributor for connection to an on-site supply air duct and air distribution within the building.

Air distribution box (variant)

Housing made of magnesium zinc sheet, air-tight, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, insulated on the inside with close-pored Polycell; configured with 2 collars as connecting piece to the on-site air distribution system.

Options for the unit**Coating of roof unit**

Side walls of the roof unit made of coated zinc sheet (anthracite grey, similar to RAL 7016).

Paint finish of below-roof unit

Exterior painting of the below-roof unit in choice of RAL colour.

Supply air silencer

Designed as a sound-absorbing mat made of rock wool; hygienically perfect with high-quality glass silk cover; mounted in the roof unit; insertion loss 3 dB.

Hydraulic assembly throttling circuit

Assembly for hydraulic throttling circuit, sized for the coil in the unit and the Hoval TopTronic® C, consisting of:

- Control valve with volume flow presetting, ball valve and automatic air vent, installed and wired in the roof unit
- Pre-insulated corrugated pipelines installed in the below-roof unit for connection to the distribution network

Pipelines in the roof unit and in the below-roof unit to be connected on site, pipelines in the roof unit to be insulated on site

Pump control

Electrical components for controlling a mixing or injection circuit in the load circuit, factory-installed in the unit control box.

Roof frame

Consisting of 4 load-bearing side walls made of galvanised sheet steel with fastening rails for the roof foil, supplied loose with the matching connecting screws.

Assembly, insulation, integration in the roof structure on site.

Protection hood

Hood made of magnesium zinc sheet for protecting the fresh air inlet against wind and snow, supplied loose with the matching connecting screws.

Assembly and mounting to the roof unit on site.

Protection hood coated

Hood made of coated zinc sheet (anthracite grey, similar to RAL 7016) for protecting the fresh air inlet against wind and snow, supplied loose with the matching connecting screws.

Assembly and mounting to the roof unit on site.

4.2 TopTronic® C – System control

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

Zone allocation

Configured in advance for the customer at the factory:

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

System structure

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

Functions, standard

- Zone-based autonomous room control. Temperature and ventilation control separately adjustable for each zone
- Room temperature control via room-supply air cascade by means of energy-optimised double sequence control with priority circuit for energy recovery (supply and extract air handling units)
- Intelligent automatic heating to reach the desired room temperature at the switching time
- 5 adjustable room temperature set values per zone:
 - Cooling protection (lower setpoint in standby)
 - Overheating protection (upper setpoint in standby)
 - Room set value winter
 - Room set value summer
 - Night cooling set value (free cooling) (supply and extract air handling units, 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:
 – CO₂ 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 CO₂ or VOC
 ST Standby

- Main operating modes of recirculated air units:

REC . Recirculation, infinitely variably adjustment
 DES.. Destratification
 ST Standby

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

Operation

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

Options for operation

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

Alarms, protection

- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms; forwarding via e-mail can be set in the parameters.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.
- Pre-programmed data points retrievable via logger function for 1 year

Options for the zone control panel

- Alarm lamp
- Socket

Per zone:

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

Power distribution

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

4.3 TopTronic® C – System control for TopVent® C-SYS

Control system for the energy-optimised operation of decentralised Hoval indoor climate systems. Maximum system size per system bus: 1 control zone with up to 6 supply air handling units and 10 recirculation air handling 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:
 - Operating panel
 - Zone controller
 - Fresh air temperature sensor
 - 1 Room temperature sensor (expandable to up to 4 room temperature sensors)
 - Safety relay
 - Electrical cabinet internally pre-wired
- 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
- 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 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 CO₂ or VOC
 - ST Standby
- Main operating modes of recirculated air units:
 - REC . Recirculation, infinitely variably adjustment
 - DES.. Destratification
 - ST Standby
- Forced heating (construction site heating) can be activated on each device before completion of the overall system (activation by Hoval service technician)
- Control of draught-free air distribution with the Hoval Air-Injector: the discharge direction is adjusted infinitely variably and automatically according to the respective operating condition and the existing temperatures (heating/cooling).

Operation

- Operating panel with LCD display, installed in the door of the zone control panel for visualisation and control of all Hoval indoor climate units registered on the bus

Options for operation

- 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

1 Type code 98

2 Connection module 102

3 Design without Air-Injector 102

4 Air distribution box 102

5 Outlet nozzle 103

6 Coating of roof unit 103

7 Paint finish of below-roof unit 103

8 Supply air silencer 103

9 Hydraulic assembly throttling circuit 104

10 Pump control 105

11 Roof frame 109



Options



H

1 Type code

1.1 Type codes for recirculation units

Availability		CHC - 9 B C / ST . V1 . D1 / -- . CA . Z / V . -- / TC . PP . --	
		Unit type	
CH	•	CH	Recirculation unit with heating section
CC	•	CC	Recirculation unit with heating/cooling section
CHC	•	CHC	Recirculation unit with heating and cooling section
		Unit size	
•	•	6	Size 6
•	•	9	Size 9
		Heating section	
•	•	-	without heating section
•	•	A	with coil type A
•	•	B	with coil type B
•	•	C	with coil type C
		Heating/cooling section	
•	•	-	without heating/cooling section
•	•	C	with coil type C
•	•	D	with coil type D
		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
•	•	DN	Outlet nozzle
		Reserve	
		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

Availability			CHC - 9 B C / ST . V1 . D1 / -- . CA . Z / V . -- / TC . PP . --		
CH	CC	CHC			
			Silencer		
•	•	•	-	without	
•	•	•	Z	Supply air silencer	
			Hydraulics		
•	•	•	-	without	
•	•	•	V	Hydraulic assembly throttling circuit	
			Reserve		
			Control system		
•	•	•	TC	TopTronic® C	
•	•		KK	Terminal box design	
			Pump control		
•	•	•	--	without	
•	•	•	PH	Heating pump	
	•	•	PK	Heating or cooling pump	
	•	•	PP	Heating pump and cooling pump	
			Reserve		

Table H1: Type code and availability of recirculation units

1.2 Type code for supply air units

Availability		SHC - 9 B C / ST . V1 . D1 / -- . CA . Z / V . -- / TC . PP . --	
Unit type			
SH	SH	SH	Supply air unit with heating section
SC	SC	SC	Supply air unit with heating/cooling section
SHC	SHC	SHC	Supply air unit with heating and cooling section
Unit size			
•	•	•	6 Size 6
•	•	•	9 Size 9
Heating section			
	•	-	without heating section
•	•	A	with coil type A
•	•	B	with coil type B
•	•	C	with coil type C
Heating/cooling section			
•		-	without heating/cooling section
•	•	C	with coil type C
•	•	D	with coil type D
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
Reserve			
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

Availability			SHC - 9 B C / ST . V1 . D1 / -- . CA . Z / V . -- / TC . PP . --	
SH	SC	SHC		
Silencer				
•	•	•	-	without
•	•	•	Z	Supply air silencer
Hydraulics				
•	•	•	-	without
•	•	•	V	Hydraulic assembly throttling circuit
Reserve				
Control system				
•	•	•	TC	TopTronic® C
Pump control				
•	•	•	--	without
•	•	•	PH	Heating pump
	•	•	PK	Heating or cooling pump
	•	•	PP	Heating pump and cooling pump
Reserve				

Table H2: Type code and availability of supply air units

2 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.

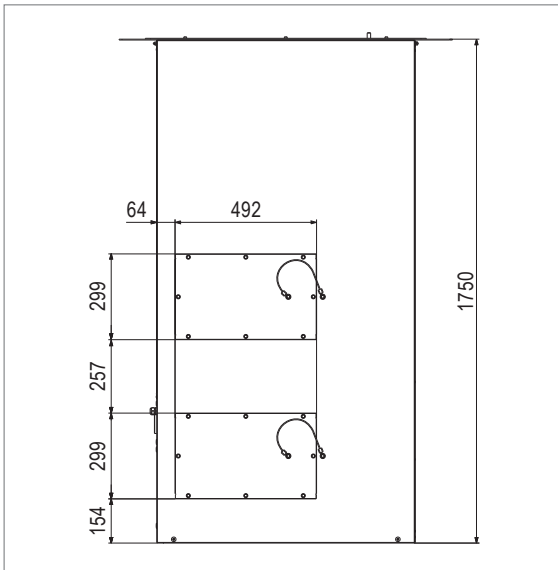


Fig. H1: Installation lids in connection module V3

3 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.

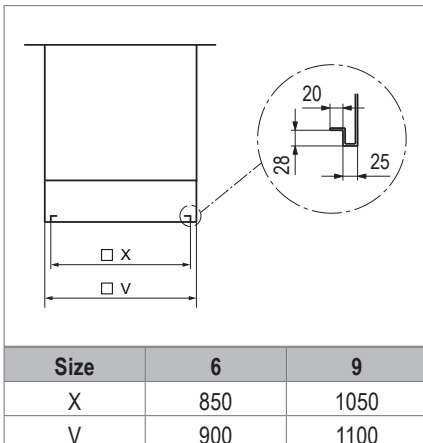


Table H3: Connection dimensions supply air duct (in mm)

4 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.

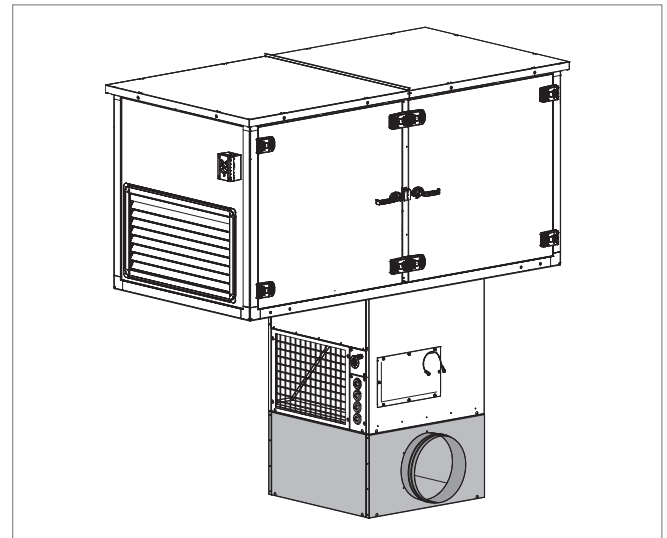


Fig. H2: TopVent® unit with air distribution box

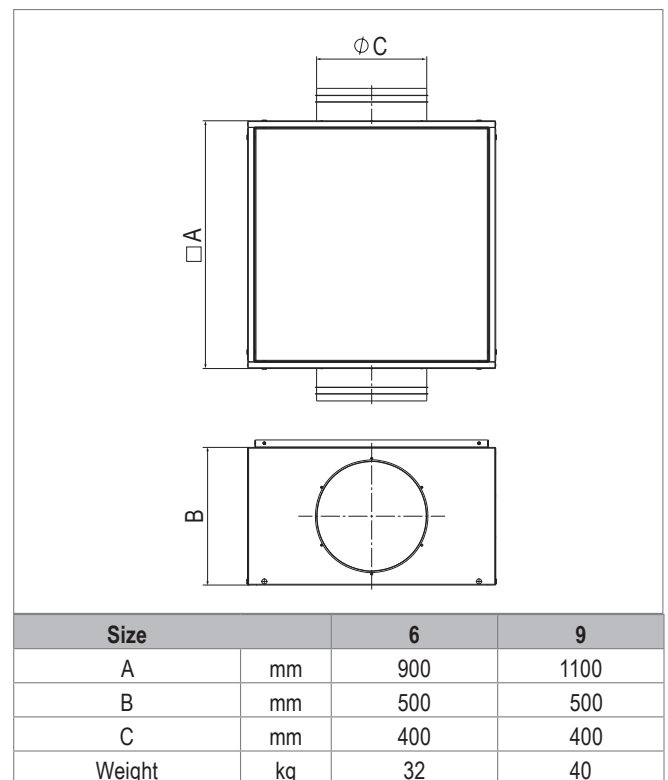


Fig. H3: Air distribution box dimensions and weights

5 Outlet nozzle

For low-cost recirculation heating the TopVent® CH unit is available with a simple outlet nozzle. The air discharge angle cannot be adjusted. Units with outlet nozzle are well-suited for applications with lower comfort requirements and for large mounting heights (e.g. in high-bay warehouses).

The outlet nozzle replaces the Air-Injector. The external dimensions of the unit remain the same.

Size		6	9
Weight	kg	31	37

Fig. H4: Outlet nozzle weights

6 Coating of roof unit

On request, the casing of the roof unit can be made of coated zinc sheet (anthracite grey, similar to RAL 7016).

7 Paint finish of below-roof unit

On request, the below-roof unit can be provided with an exterior painting in choice of RAL colour.

8 Supply air silencer

The supply air silencer reduces noise emissions from TopVent® units. It consists of a sound-absorbing mat made of rock wool and is mounted above the fan on the casing ceiling. Insertion attenuation is 3 dB compared with the total sound power level of each TopVent® unit. Weight: 20 kg.

9 Hydraulic assembly throttling circuit

For easy installation, TopVent® units are available with a pre-installed assembly for the hydraulic throttling circuit. The assembly consists of the following components:

- Installed and wired in the roof unit, each for the heating and cooling circuit:
 - Pressure independent control valve for precise temperature control with digitally configurable, proportional actuator
 - Ball valve
 - Automatic air vent
- Installed in the below-roof unit for connection to the distribution network:
 - Pre-insulated corrugated pipelines through the connection module, pre-insulated for cooling circuits

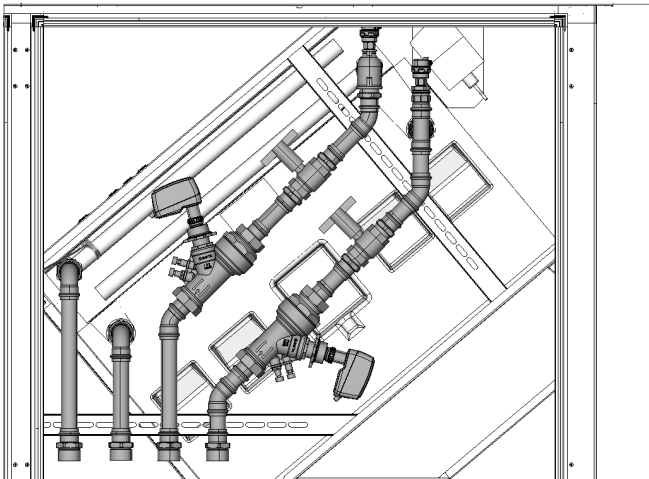


Fig. H5: Hydraulic assembly installed in the roof unit (here for heating and cooling in a 4-pipe system)

Please note the following:

- Connect the piping in the roof unit and in the below-roof unit.
- Insulate the pipelines in the roof unit.
- Connect the on-site pipe network to the below-roof unit in the hall.
- Mount the pipelines so that their weight does not need to be absorbed by the unit.

Technical data

Size	6		9	
	DN 40		DN 50	
Differential pressure ¹⁾	ΔpV_{\max} ²⁾	kPa	400	400
	ΔpV_{\min} ³⁾	kPa	30	30
Flow range ⁴⁾	q_{\max}	l/h	1000...6500	2150...11200
Media	Water, neutral fluids, water-glycol mixtures 0-57 %			

¹⁾ Valid for maximum setting, fully open
²⁾ The maximum allowed pressure drop over the valve to fulfil all stated performances
³⁾ The minimum recommended pressure drop over the valve, for proper differential pressure control
⁴⁾ Flow continuously adjustable within the range
 q_{\max} = l/h at each setting and fully open valve plug

Table H4: Control valves technical data

Actuators technical data	
Power supply	24 VAC/VDC
Frequency	50/60 Hz
Power consumption for wire sizing	4.0 VA (VAC)
	1.9 W (VDC)
Control voltage	0(2)...10 VDC ¹⁾
Position response	0(2)...10 VDC ¹⁾
Running time	60 s
1 digital input	max. 100 Ω , cable max. 10 m long or shielded
1 relay	max. 5 A, 30 VDC/250 VAC on resistive load

¹⁾ Factory setting 2...10 VDC

Table H5: Actuators technical data

Unit type		CH, CC, SH, SC		CHC, SHC	
Size		6	9	6	9
Assembly in the roof unit	kg	8.9	10.7	18.0	21.6
Corrugated pipelines in the below-roof unit					
Connection module V1	kg	2.8		5.3	
Connection module V2	kg	3.7		7.1	
Connection module V3	kg	4.6		8.9	

Table H6: Hydraulic assembly weights

Unit type	Connection module	Water quantity in l/h													
		1000	1250	1500	1750	2000	2500	3000	3500	4000	5000	6000	8000	10000	15000
CH, CC SH, SC	V1	0.21	0.33	0.51	0.66	0.83	1.31	1.89	2.51	3.27	5.28	7.53	13.31	20.84	46.94
	V2	0.28	0.45	0.69	0.89	1.13	1.78	2.56	3.41	4.44	7.17	10.23	18.08	28.31	63.77
	V3	0.57	0.57	0.87	1.13	1.43	2.25	3.24	4.31	5.61	9.06	12.93	22.85	35.78	80.60
CHC, SHC Heating circuit	V1	0.18	0.29	0.44	0.57	0.72	1.13	1.62	2.16	2.81	4.53	6.47	11.43	17.89	40.30
	V2	0.25	0.40	0.62	0.80	1.01	1.59	2.30	3.06	3.98	6.42	9.17	16.2	25.36	57.13
	V3	0.52	0.52	0.80	1.03	1.31	2.06	2.97	3.96	5.15	8.31	11.87	20.97	32.83	73.96
CHC, SHC Cooling circuit	V1	0.21	0.33	0.51	0.66	0.83	1.31	1.89	2.51	3.27	5.28	7.53	13.31	20.84	46.94
	V2	0.28	0.45	0.69	0.89	1.13	1.78	2.56	3.41	4.44	7.17	10.23	18.08	28.31	63.77
	V3	0.57	0.57	0.87	1.13	1.43	2.25	3.24	4.31	5.61	9.06	12.93	22.85	35.78	80.60

Table H7: Pressure drop of the corrugated pipelines in the below-roof unit (values in kPa)

10 Pump control

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

Please note the following:

- Not only the mixing valves but also the pumps in the load circuit are controlled directly by the unit control box.
- Terminals for wiring the mixing valves and the pumps in the load circuit are located in the unit control box.
- Install an automatic air vent in the roof unit at the highest point of the pipework.
- The return temperature sensor is pre-installed at the factory.
- Make sure that valves and pumps which meet the following requirements are provided on site.

Requirements for mixing valves

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

Requirements for pumps

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

Requirements on changeover valves

Use changeover valves conforming to the following specification for heating and cooling in the 2-pipe system:

- 3-way changeover valves
- Supply voltage 24 V AC
- 1-wire control (0/24 V AC)
- Position response via limit switches (0°/90°)
- Power consumption:
 - max. 44 VA (TopTronic® C System control)
 - max. 13 VA (TopTronic® C System control for TopVent® C-SYS)

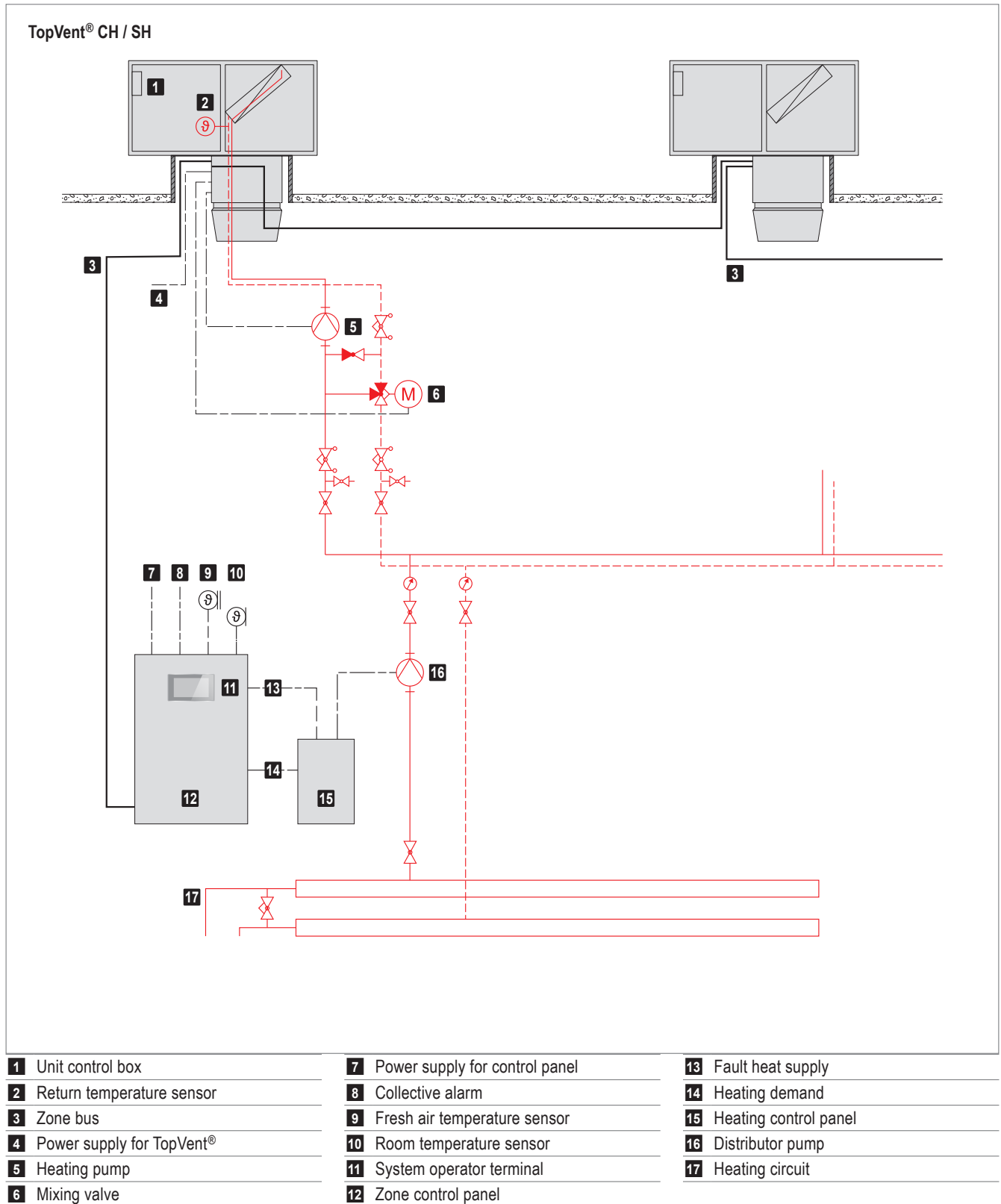


Fig. H6: Schematic diagram for injection circuit TopVent® CH / SH

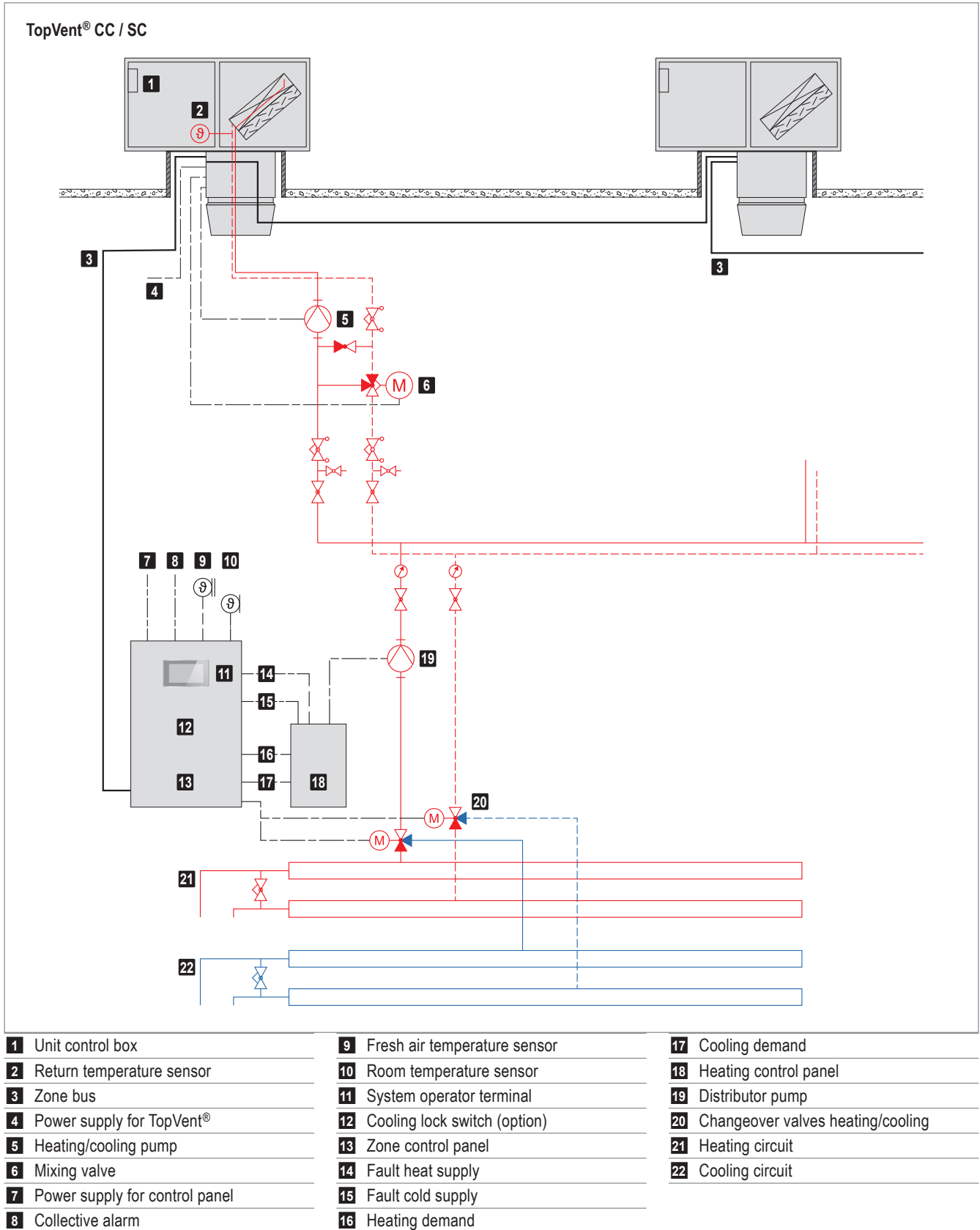


Fig. H7: Schematic diagram for injection circuit TopVent® CC / SC

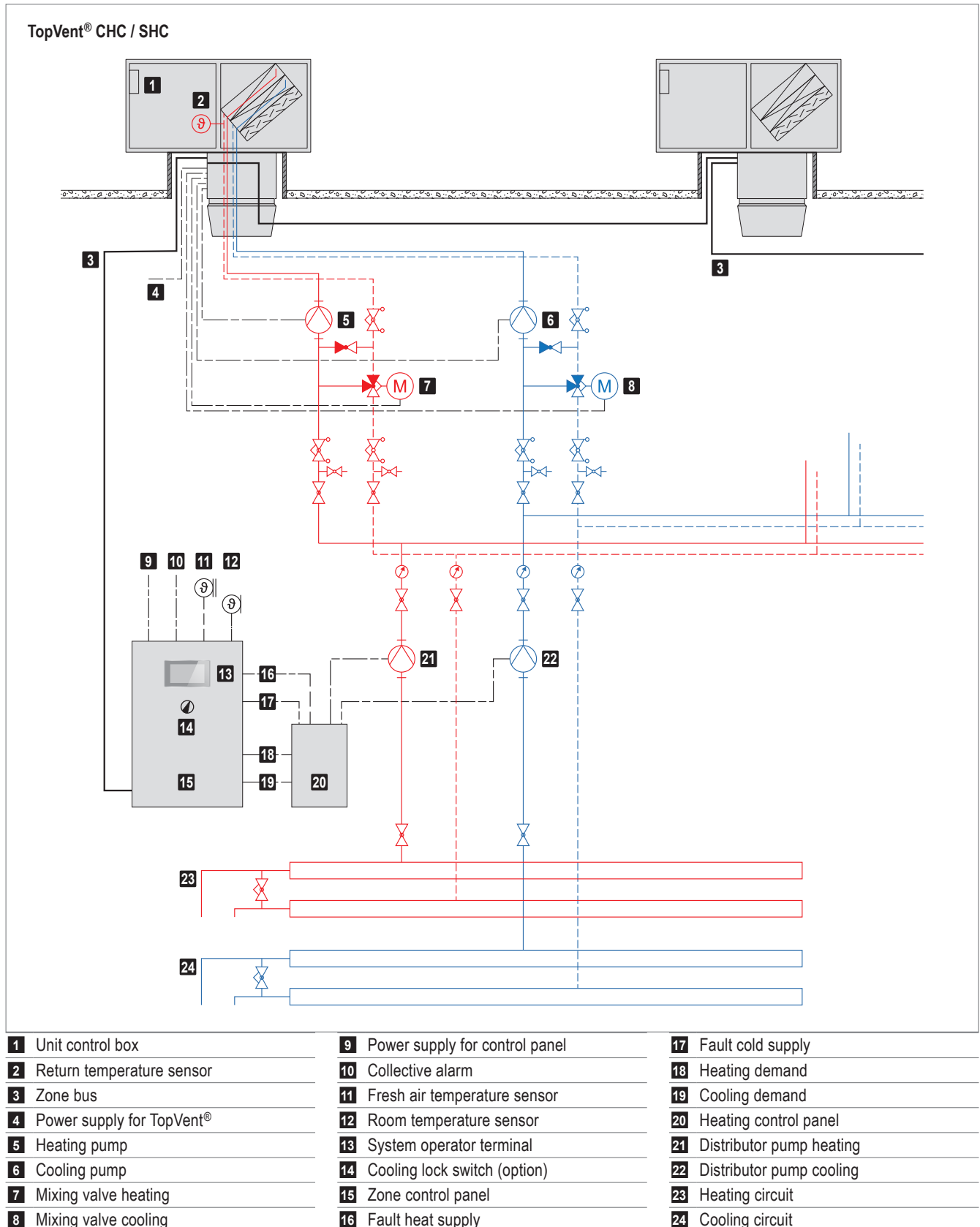


Fig. H8: Schematic diagram for injection circuit TopVent® CHC / SHC

11 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. They are supplied loose with the appropriate connecting screws for assembly on site.

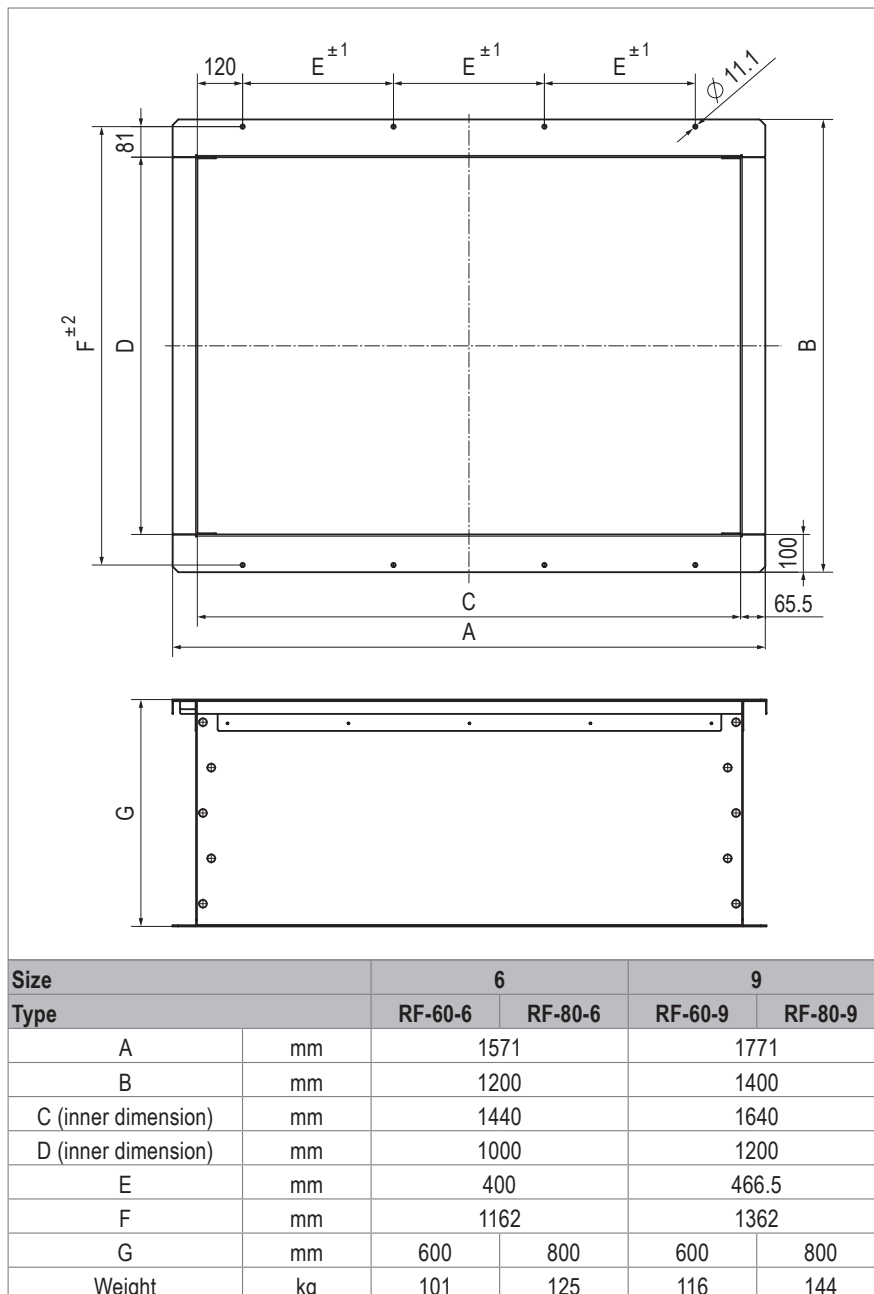


Fig. H9: Roof frame dimensions and weights

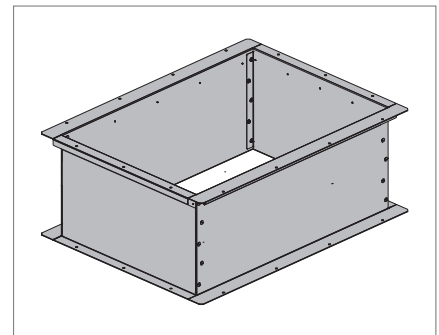


Fig. H10: Roof frame

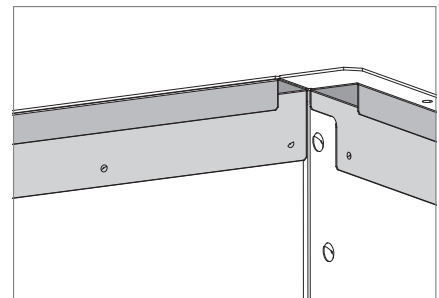


Bild H11: Fastening rails for the roof foil

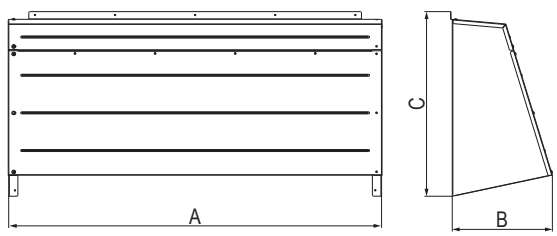
12 Protection hood

To protect the fresh air inlet from strong winds and snowfall, protection hoods are available as accessories for TopVent® supply air units. They are supplied loose with the appropriate connecting screws for assembly on site.

2 designs are available, matching to the roof unit:

Size	6	9	6	9
Type	H-6	H-9	H-C-6	H-C-9
Weight	14.0	17.8	11.2	13.6
Material	magnesium zinc sheet		coated zinc sheet (anthracite grey)	

Table H8: Designs and weights (in kg)



Size	6	9
A	1220	1420
B	377	381
C	603	703

Table H9: Protection hood dimensions and weights

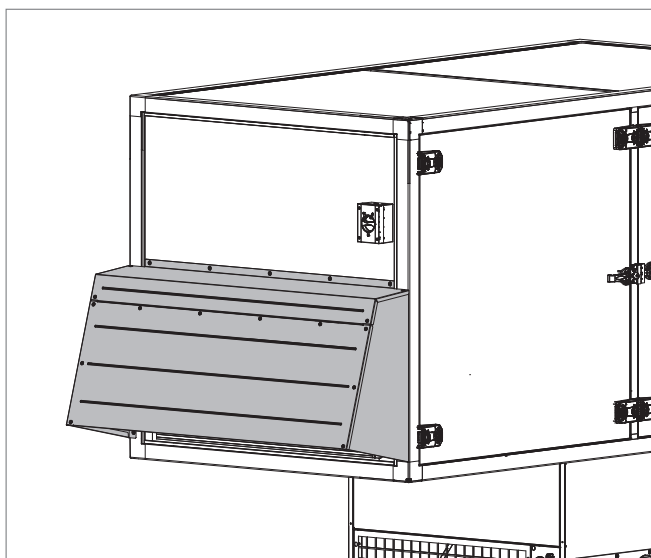


Fig. H12: Fresh air inlet with protection hood



Transport and installation

1 Installation 112

2 Hydraulic installation 114

3 Electrical installation 118

1 Installation

1.1 Preparation

The following guidelines are important when preparing for installation:

- The scope of delivery includes:
 - TopVent® unit, delivered in 2 parts on pallets (roof unit, below-roof unit)
 - Accessories (lifting kit, transport eyes, installation material)
 - Optional components
- The units are installed in or on the roof. A crane or helicopter is required.
- Transport eyes are supplied for lifting the below-roof unit.
 - Use lifting ropes at least 2 m in length to lift the below-roof unit.
- A lifting kit is supplied for lifting the roof unit.
 - Use lifting straps at least 3 m in length to lift the roof unit.
- Use the roof frames available as accessories for quick and easy installation of the TopVent® units in the roof.
- A sealing compound is required for sealing (e.g. Sikaflex®-221).
- Follow the installation instructions included.



Notice

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

1.2 Positioning

- 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.

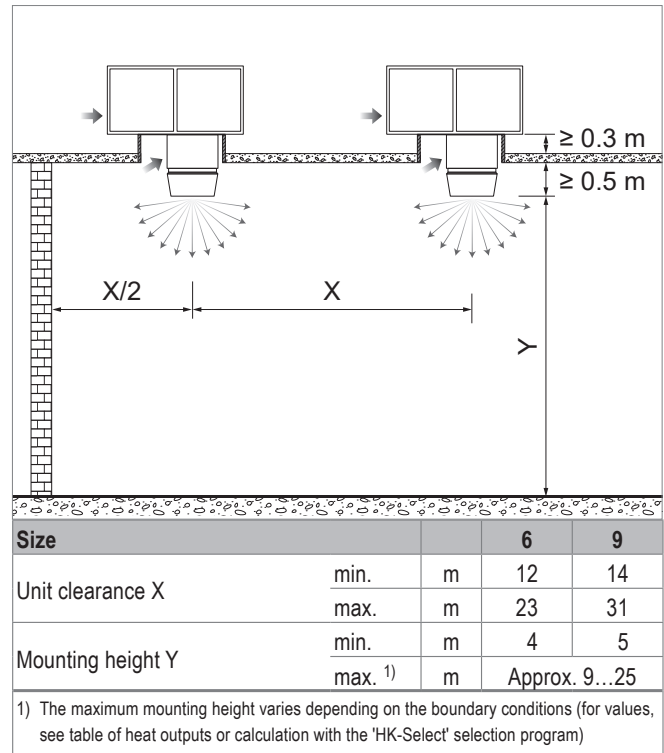


Fig. I1: Minimum and maximum distances

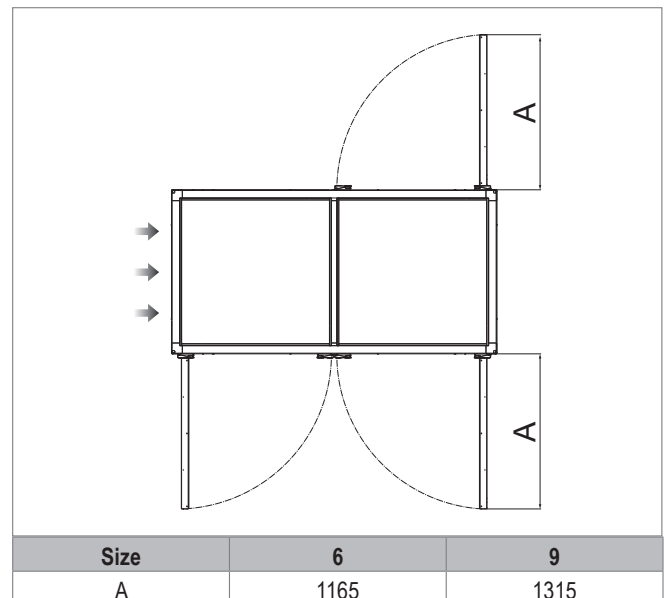


Fig. I2: Space requirements for opening the access doors (dimensions in mm)

1.3 Roof frame

Roof frames are required for installing TopVent® units in the roof. Suitable roof frames are available as accessories (see part H 'Options', section 11).

Please consider the following in the design process:

- The extract air grille must be freely accessible under the roof.
- Observe the minimum distances according to Fig. I1.
- The roof frame must protrude at least 300 mm from the roof, so that no water can penetrate during a rainstorm or snowfall and to ensure that the fresh air weather protection is sufficiently high above the roof.



Notice

Roof frames are available in 2 heights and connection modules in 3 lengths for adapting to the local installation situation.

- The condensate must be able to drain off freely.
- Ensure that the supporting surface for the unit is flat and level.
- Insulate the roof frame before installing the unit (thermal insulation, 60 mm thick).
- Embed the roof frame tightly into the roof structure with roof foil.
- The following applies to any roof frames constructed on site:
 - The supporting surface must correspond to the specifications in Fig. H9 on page 109.

1.4 Unit installation

Proceed as follows to position the unit:

Below-roof unit

- Apply sealing compound to the roof frame.
- Fasten the adjustment screws in 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

- Attach the lifting kit to the roof unit.
- Attach the lifting straps.
- 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 lifting kit.

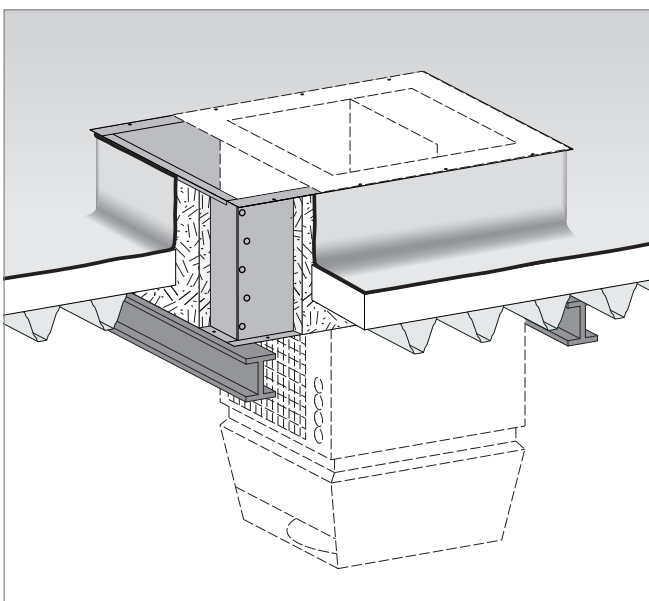


Fig. I3: Conceptual drawing of the roof frame

2 Hydraulic installation

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



Notice

Use the 'Hydraulic assembly throttling circuit' option for quick and easy hydraulic installation.

Requirements on changeover valves

Use changeover valves conforming to the following specification for heating and cooling in the 2-pipe system:

- 3-way changeover valves
- Supply voltage 24 V AC
- 1-wire control (0/24 V AC)
- Position response via limit switches (0°/90°)
- Power consumption:
 - max. 44 VA (TopTronic® C System control)
 - max. 13 VA (TopTronic® C System control for TopVent® C-SYS)

Requirements on the boiler system and the distributor circuit

- Hydraulically balance the pipework for the the individual units within a control zone to ensure even distribution.
- The heating medium must be available at the control valve in the required amount and temperature.
- The condensate separator in cooling units only functions while the fan is running. No coolant must be allowed to circulate in the coil when the unit is switched off.
- Depending on local conditions, check whether compensators for linear expansion are required for the supply and return lines and/or articulated connections are required for the units.
- Do not fasten any loads to the coil, e.g. by means of the flow or return lines.
- Insulate the hydraulic lines.
- Install an automatic air vent in the roof unit at the highest point of the pipework.
- The return temperature sensor is pre-installed at the factory.

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

Requirements for control valves

- Use 2-way control valves with the following flow characteristics:
 - Equal percentage control path
- The valve authority must be ≥ 0.5 .
- The maximum run time of the valve actuator is 60 s.
- The valve actuator must be continuous, i.e. the stroke changes in proportion to the control voltage (0...10 VDC or 2...10 VDC).
- The valve actuator must be designed with a position response (0...10 VDC or 2...10 VDC).
- The maximum power consumption is 20 VA.
- Install the valve in or close to the unit (max. distance 2 m).

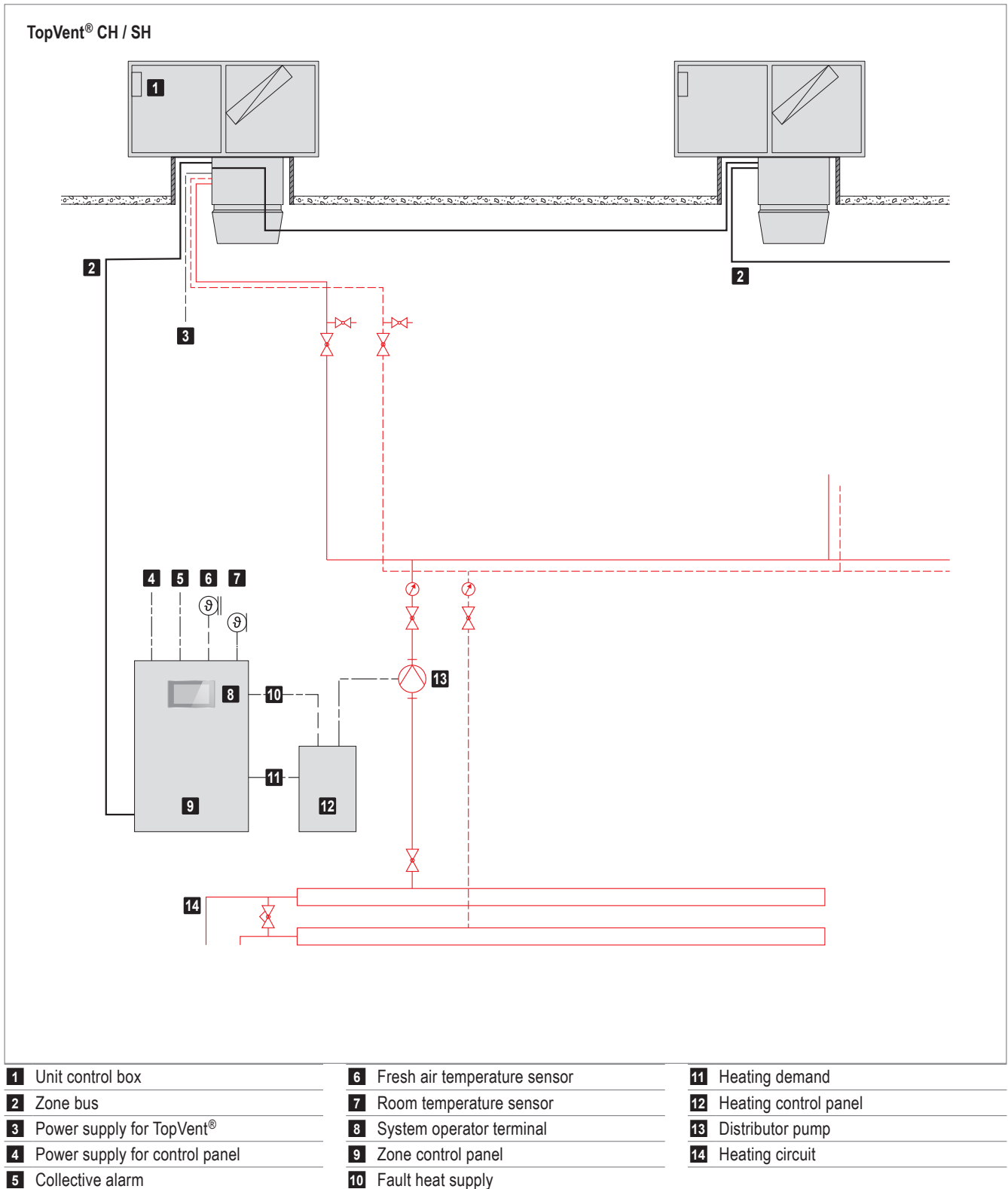


Fig. I4: Schematic diagram for throttling circuit TopVent® CH / SH (with hydraulic assembly throttling circuit in the unit – see part H 'Options', section 9)

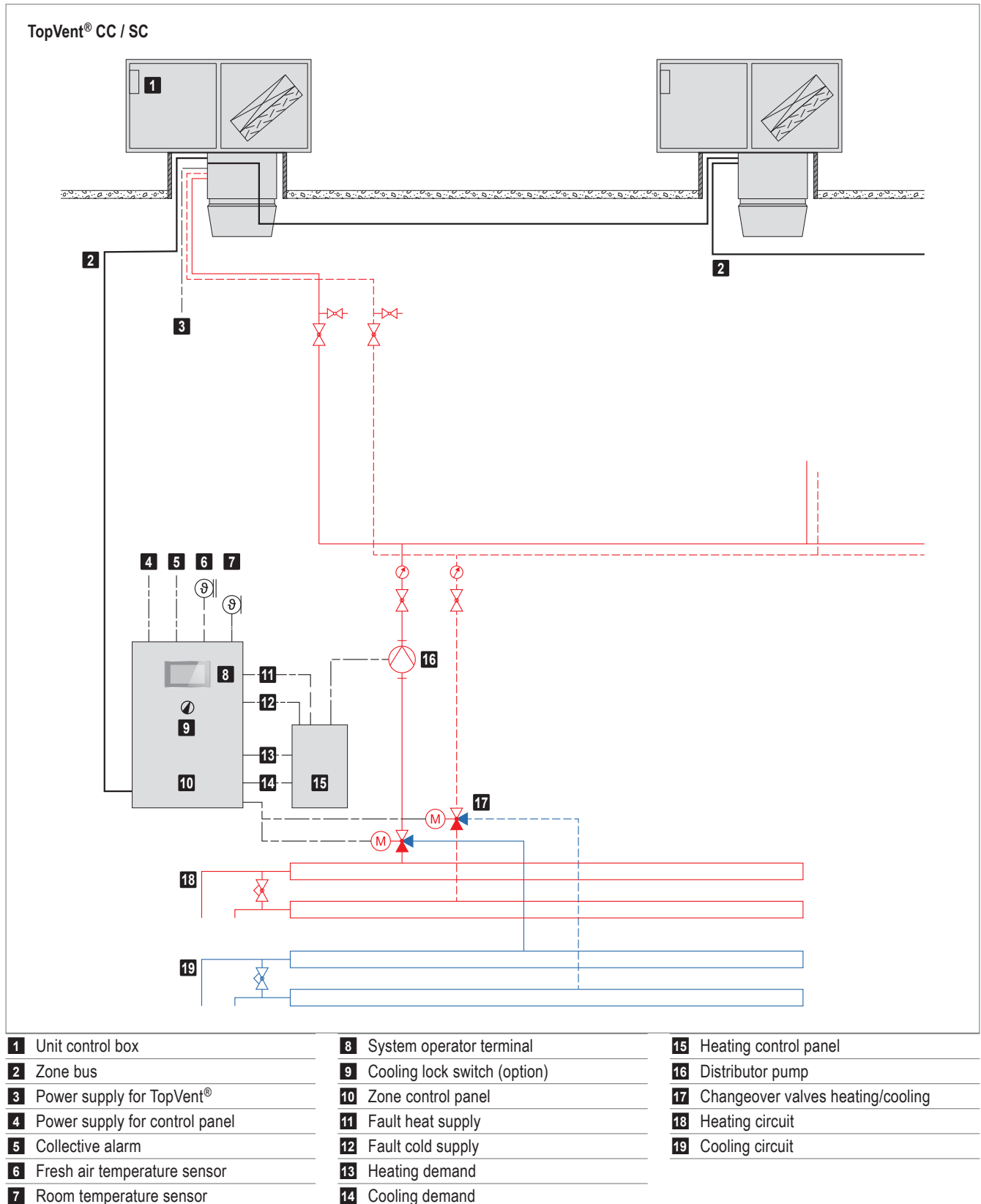


Fig. I5: Schematic diagram for throttling circuit TopVent® CC / SC (with hydraulic assembly throttling circuit in the unit – see part H 'Options', section 9)

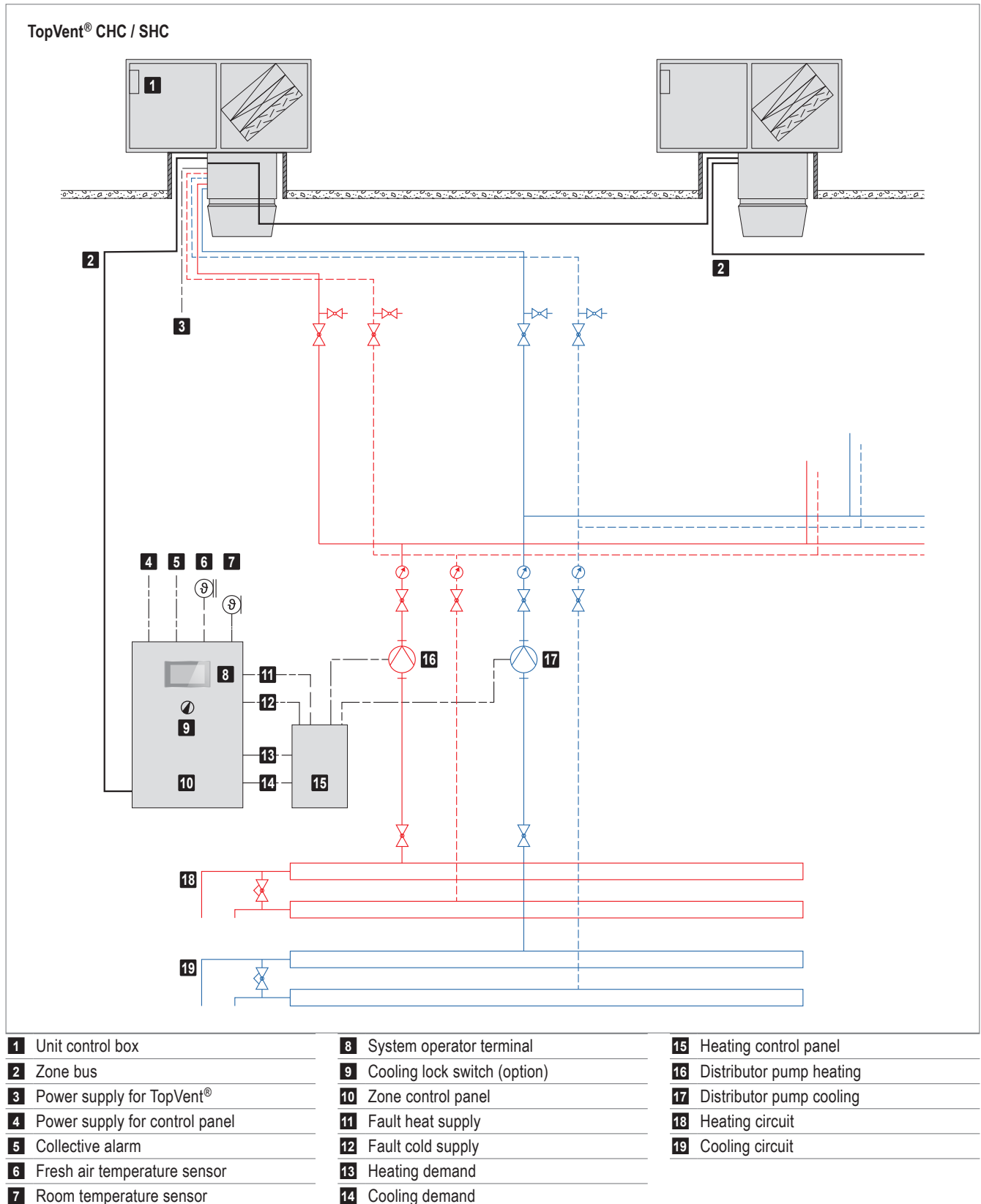


Fig. I6: Schematic diagram for throttling circuit TopVent® CHC / SHC (with hydraulic assembly throttling circuit in the unit – see part H 'Options', section 9)

3 Electrical installation

The electrical installation must only be carried out by a qualified electrician.

- Observe the relevant regulations (e.g. EN 60204-1).
- Choose the dimensions of the cable cross sections in line with the applicable regulations.
- Route signal and bus lines separately from mains cables.
- Make sure the lightning protection system for the units or for the entire building is planned and carried out by professionals.
- Provide overload protection equipment on site in the mains connection line of the zone control panel.
- Carry out the electrical installation according to the wiring diagram:
 - Power supply for TopVent®
 - Zone bus based on system layout
 - Signal lines
- Connect optional components to the unit control box (mixing valve, pump).

3.1 Cable list for on-site connections – TopTronic® C

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

Component	Designation	Voltage	Cable	Comments	Start	Target	
	Zone operator terminal (if external)	24 VAC	J-Y(ST)Y 4 × 2 × 0.8 mm	Power supply, 1 A fusing, max. 250 m length	Zone control panel	Zone operator terminal	
	External sensor values	0-10 VDC	J-Y(ST)Y 2 × 2 × 0.8 mm		On-site	Zone control panel	
	External set values	0-10 VDC	J-Y(ST)Y 2 × 2 × 0.8 mm		On-site	Zone control panel	
	Load shedding input	24 VAC	NYM-O 2 × 1.5 mm ²	max. 1 A	On-site	Zone control panel	
	Operating selector switch on terminal (analogue)	0-10 VDC	J-Y(ST)Y 2 × 2 × 0.8 mm		On-site (switch)	Zone control panel	
	Operating selector switch on terminal (digital)	0-10 VDC	J-Y(ST)Y 6 × 2 × 0.8 mm		On-site (switch)	Zone control panel	
	Operating selector button on terminal	24 VAC	J-Y(ST)Y 6 × 2 × 0.8 mm		On-site (button)	Zone control panel	
	Forced off	24 VAC	NYM-O 2 × 1.5 mm ²	max. 1 A	On-site	Zone control panel	
	Heating/cooling changeover	24 VAC	NYM-O 2 × 1.5 mm ²	Signal external enabling/setting max. 1 A	On-site	Zone control panel	
	Changeover valve flow	24 VAC	NYM-O 7 × 1.5 mm ²	see valve specification	Zone control panel	Valve	
	Changeover valve return	24 VAC	NYM-O 7 × 1.5 mm ²	see valve specification	Zone control panel	Valve	
	Signal for external extract air fan	2-10 VDC	J-Y(ST)Y 2 × 2 × 0.8 mm	for TopVent® SH, SC, SHC	Zone control panel	On-site	
TopTronic® C System control for TopVent® (C-SYS) Zone control panel	Power supply	1 × 230 VAC	NYM-J 3 × 1.5 mm ²		On-site	Zone control panel	
	Zone bus		J-Y(ST)Y 2 × 2 × 0.8 mm	max. 500 m length	Zone control panel	Hoval units	
	Integration into the building management system			Ethernet ≥ CAT 5	BACnet, Modbus IP	Zone control panel	On-site (BMS)
				J-Y(ST)Y 2 × 2 × 0.8 mm	Modbus RTU	Zone control panel	On-site (BMS)
	Room temperature sensor		J-Y(ST)Y 2 × 2 × 0.8 mm	max. 250 m	Zone control panel	Sensors	
	Additional room temperature sensors		J-Y(ST)Y 2 × 2 × 0.8 mm	max. 250 m	Zone control panel	Sensors	
	Combination sensor room air quality, temperature and humidity		J-Y(ST)Y 4 × 2 × 0.8 mm	max. 250 m	Zone control panel	Sensors	
	Fresh air temperature sensor		J-Y(ST)Y 2 × 2 × 0.8 mm	max. 250 m	Zone control panel	Sensors	
	Heating demand	Volt-free max. 250 VAC max. 24 VDC	NYM-O 2 × 1.5 mm ²	max. 8 A		Zone control panel	On-site
	Setpoint heating demand	2-10 VDC	J-Y(ST)Y 2 × 2 × 0.8 mm	max. 250 m	Zone control panel	On-site	
	Cooling demand	Volt-free max. 250 VAC max. 24 VDC	NYM-O 2 × 1.5 mm ²	max. 8 A		Zone control panel	On-site
	Fault heat supply	24 VAC	NYM-O 2 × 1.5 mm ²	max. 1 A	On-site	Zone control panel	
	Fault cold supply	24 VAC	NYM-O 2 × 1.5 mm ²	max. 1 A	On-site	Zone control panel	
	Collective alarm	Volt-free max. 250 VAC max. 24 VDC	NYM-O 2 × 1.5 mm ²	max. 8 A max. 2 A		Zone control panel	On-site
	External setpoint fresh air ratio	0-10 VDC	J-Y(ST)Y 2 × 2 × 0.8 mm		On-site	Zone control panel	
	Operating selector switch on terminal (digital)	0-10 VDC	J-Y(ST)Y 6 × 2 × 0.8 mm		On-site (switch)	Zone control panel	
	Operating selector button on terminal	24 VAC	J-Y(ST)Y 6 × 2 × 0.8 mm		On-site (button)	Zone control panel	
	Forced off	24 VAC	NYM-O 2 × 1.5 mm ²	max. 1 A	On-site	Zone control panel	

Component	Designation	Voltage	Cable	Comments	Start	Target	
	Heating/cooling changeover	24 VAC	NYM-O 2 × 1.5 mm ²	Signal external enabling/setting max. 1 A	On-site	Zone control panel	
	Changeover valve flow	24 VAC	NYM-O 7 × 1.5 mm ²	see valve specification	Zone control panel	Valve	
	Changeover valve return	24 VAC	NYM-O 7 × 1.5 mm ²	see valve specification	Zone control panel	Valve	
	Signal for external extract air fan	2-10 VDC	J-Y(ST)Y 2 × 2 × 0.8 mm	for TopVent® SH, SC, SHC	Zone control panel	On-site	
TopVent® unit	Power supply	3 × 400 VAC	NYM-J 5 × 1.5 mm ² (min.)		Zone control panel or on-site	TopVent® unit	
	Zone bus		J-Y(ST)Y 2 × 2 × 0.8 mm	max. 500 m length	Zone control panel	TopVent® unit	
	Control valve heating	24 VAC	NYM-O 4 × 1.0 mm ²	with Hydraulic assembly option: control valves installed and wired at the factory	TopVent® unit	Valve	
	Control valve cooling	24 VAC	NYM-O 4 × 1.0 mm ²		TopVent® unit	Valve	
	Heating pump		230 VAC	NYM-J 3 × 1.5 mm ²	Power supply	TopVent® unit	Pump
			24 VAC	NYM-O 4 × 1.0 mm ²	Control line	TopVent® unit	Pump
	Cooling pump		230 VAC	NYM-J 3 × 1.5 mm ²	Power supply	TopVent® unit	Pump
			24 VAC	NYM-O 4 × 1.0 mm ²	Control line	TopVent® unit	Pump
Forced off	24 VAC	NYM-O 2 × 1.5 mm ²		max. 1 A for TopVent® SH, SC, SHC	On-site	TopVent® unit	
Door contact	Volt-free	J-Y(ST)Y 1 × 2 × 0.8 mm		for TopVent® CH, CC, CHC	On-site	TopVent® unit	

Table I1: Cable list for on-site connections – TopTronic® C

3.2 EasyTronic EC

Component	Designation	Voltage	Cable	Comments	Start	Target	
EasyTronic EC	Power supply	1 × 230 VAC	NYM 2 × 1.5 mm ² (min.)		On-site	Hoval controller	
	Controller	Heating/cooling changeover	24 VAC	NYM-O 2 × 1.5 mm ²	max. 1 A	On-site	Hoval controller
		Door contact	24 VDC	NYM 2 × 1.0 mm ²		On-site	Hoval controller
		Modbus RTU		J-Y(ST)Y 2 × 2 × 0.8 mm	max. 300 m length	On-site (BMS)	Hoval controller
		External room temperature sensor		J-Y(ST)Y 2 × 2 × 0.8 mm	shielded, max. 30 m length	Sensors	Hoval controller
		System bus		J-Y(ST)Y 4 × 2 × 0.8 mm	Fan, air distribution	Hoval controller	Hoval units
		Pump/valve control	230 VAC 24 VDC	depending on the number of contacts	via on-site relay, max 3 A	Pump/valve	Relay (on-site)
TopVent®	Power supply	3 × 400 VAC	NYM-J 5 × 1.5 mm ² (min.)	max. 1 A	On-site	TopVent® unit	
	System bus		J-Y(ST)Y 4 × 2 × 0.8 mm	Fan, air distribution	Hoval controller	TopVent® unit	
Unit	Differential pressure switch air filter		NYM 2 × 1.0 mm ²	Signal to on-site lamp or controller	TopVent® unit	On-site	

Table I2: Cable list for on-site connections – EasyTronic EC

3.3 Terminal box design

Actuator Air-Injector	
Control voltage	2...10 VDC
Setting range	2 - 6.44 V / 0° - 50°
Position response	2...10 VDC
Fan	
Enable signal	digital
Control voltage	0...10 VDC
Air filter	
Signal differential pressure switch	digital
Control valve actuator ('Hydraulic assembly throttling circuit' option)	
Control voltage	0(2)...10 VDC
Position response	0(2)...10 VDC

Table I3: Control signals for TopVent® units in terminal box design

1 Design example. 124
2 Maintenance schedule 126
3 Checklist for project discussions 127



System design



J

1 Design example



Notice

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

Design data	Example
<ul style="list-style-type: none"> ■ Geometry of the room ■ Internal heat gains ■ People in the room ■ Heating and cooling with central energy supply (boiler and water chiller) ■ Improvement of air quality, fresh air supply for the people in the room (fresh air flow rate per person = 30 m³/h) 	<p>50 × 60 × 12 m 28 kW 20 people</p>
<p>Design conditions heating:</p> <ul style="list-style-type: none"> ■ Fabric heat losses ■ Fresh air temperature ■ Room temperature ■ Extract air temperature ■ Temperature of the heating medium 	<p>350 kW - 15 °C 18 °C 20 °C 60 °C / 40 °C</p>
<p>Design conditions cooling:</p> <ul style="list-style-type: none"> ■ Transmission sensible gains ■ Fresh air conditions ■ Room air conditions ■ Extract air temperature ■ Temperature of the cooling medium 	<p>140 kW 32 °C / 40 %rh 26 °C / 40 %rh 28 °C 6 °C / 12 °C</p>
<p>Fresh air supply</p> <ul style="list-style-type: none"> ■ Required fresh air flow rate in total: ■ Fresh air ratio of supply air units: max. 10 % of the nominal air flow rate <p><i>The fresh air ratio can be adjusted from 0...100 %. Where EU Regulation 1253/2014 applies, it must be restricted to max. 10 % in the design conditions.</i></p> <ul style="list-style-type: none"> ■ Calculate the required number of supply air units from the nominal air flow rate. 	<p>20 × 30 = 600 m³/h</p> <p>Size 6: max. 600 m³/h fresh air Size 9: max. 900 m³/h fresh air</p> <p>→ 1 TopVent® SC unit</p>
<p>Mounting height</p> <ul style="list-style-type: none"> ■ Calculate the actual mounting height (= distance between the floor and the bottom edge of the units). <p>$Y = \text{Hall height} - \text{distance from ceiling} - \text{unit height}$</p> <ul style="list-style-type: none"> ■ Compare the actual mounting height with the minimum and maximum mounting height (see Fig. I1 on page 112 and HK-Select). 	<p><u>Supply air units:</u> Size 6 → OK Size 9 → OK</p> <p><u>Recirculation units:</u> Size 6 → OK Size 9 → OK</p>

Required performance for covering fabric heat losses																																																																					
<ul style="list-style-type: none"> Required heat output for coverage of fabric heat losses in total: $Q_{H_req} = \text{Fabric heat losses} - \text{internal heat loads}$ 	350 – 28 = 322 kW																																																																				
<ul style="list-style-type: none"> Required cooling capacity for coverage of transmission sensible gains in total: $Q_{C_req} = \text{Transmission sensible gains} + \text{internal heat loads}$ 	140 + 28 = 168 kW																																																																				
Required heat output of recirculation units																																																																					
<ul style="list-style-type: none"> Determine the required heat output of the recirculation units based on the output of the supply air unit. $Q_{H_Recirculation} = Q_{H_req} - Q_{H_Supply\ air}$ <p><i>For the supply air unit, take into account only the share of capacity that is used for coverage of fabric heat losses (separately shown in HK-Select).</i></p>	<table border="1"> <thead> <tr> <th>Type</th> <th>$Q_{H_Supply\ air}$</th> <th>$Q_{H_Recirculation}$</th> </tr> </thead> <tbody> <tr> <td>SC-6/C</td> <td>40.5</td> <td>322 – 40.5 = 281.5</td> </tr> <tr> <td>SC-9/C</td> <td>63.2</td> <td>322 – 63.2 = 258.8</td> </tr> <tr> <td>SC-9/D</td> <td>79.3</td> <td>322 – 79.3 = 242.7</td> </tr> </tbody> </table> <p>(values in kW)</p>	Type	$Q_{H_Supply\ air}$	$Q_{H_Recirculation}$	SC-6/C	40.5	322 – 40.5 = 281.5	SC-9/C	63.2	322 – 63.2 = 258.8	SC-9/D	79.3	322 – 79.3 = 242.7																																																								
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<ul style="list-style-type: none"> Determine the minimum number of recirculation units depending on the available supply air units. Take into account the following criteria: <ul style="list-style-type: none"> Floor area covered Heat output Cooling capacity Unit clearances 																																																																					
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1 unit SC-9/D	CC-6/C	4	6	5	5	6																																																															
	CC-9/C	3	4	≈ 3 (-1 kW)	3	4																																																															
	CC-9/D	3	≈ 3 (-2 kW)	3	3	3																																																															
<ul style="list-style-type: none"> Choose the final solution from the remaining possibilities, depending on the geometry of the hall and the costs. 																																																																					

2 Maintenance schedule

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

Table J1: Maintenance schedule

Project

Project No.

Date

Name

Function

Address

Tel.

Fax

E-mail

Information about the hall

Application

Type

Insulation

Length

Width

Height

Is the roof strong enough?

yes no

Are there window areas?

yes no

Percentage?

Is there a crane?

yes no

Height?

Is there enough space for installation and servicing?

yes no

Are there any voluminous installations or machines?

yes no

Are pollutants present?

yes no

Which?

– If yes, are they heavier than air?

yes no

Is oil contained in the extract air?

yes no

Is dust present?

yes no

Dust level?

Is there high humidity?

yes no

How much?

Are local machine extractions required?

yes no

Are any conditions imposed by public authorities?

yes no

Which?

Are sound level requirements to be fulfilled?

yes no

Which?

Design data

Internal heat gains (machines, ...) kW

Heating and cooling

Unit size

Control zones

Design conditions heating

- Standard outside temperature °C
- Room temperature °C
- Extract air temperature °C
- Fabric heat losses kW

Design conditions cooling

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

Further information

Hoval quality.
You can count on us.

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

Hoval is one of the leading international companies for indoor climate solutions. More than 75 years of experience continuously motivate us to design innovative system solutions. We manufacture complete systems for heating, cooling and ventilation to more than 50 countries.

We take our responsibility for the environment seriously. Energy efficiency is at the heart of the heating and ventilation systems we design and develop.

Responsibility for energy and environment

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