TopVent® NHV

Recirculation unit for heating high spaces
with lower comfort requirements (e.g. high-bay warehouses)

1 Use

1.1 Intended use

TopVent® NHV units are recirculation units intended for heating high spaces. They have the following functions:
- Heating (with connection to a hot water supply)
- Recirculation operation
- Air distribution via outlet nozzle
- Air filtration (optional)

Also included under intended use are compliance with the installation, commissioning, operating and maintenance provisions (operating instructions). Any use beyond this is considered improper use. The manufacturer can accept no liability for damage resulting from improper use.

1.2 User group

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

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

2 Construction and operation

The TopVent® NHV unit is used for low-cost recirculation heating in high halls. The unit is installed under the ceiling. It takes in room air, heats it by means of the heating coil and injects it back into the room via the outlet nozzle. The air distribution cannot be adjusted with TopVent® NHV. Therefore, the unit is especially suited to applications where comfort requirements are relatively low (e.g. high-bay warehouses).
With its high performance, the TopVent® NHV covers a large area. Therefore, compared to other systems, fewer units are needed to achieve the required conditions.
2 unit sizes, variable fans, different coil types and a whole string of accessories provide a tailored solution for any hall.

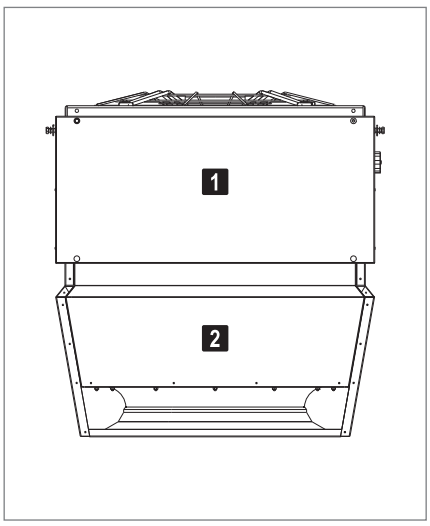
2.1 Unit construction

The TopVent® NHV consists of the following components:
- Heating section (with fan and heating coil)
- Outlet nozzle

Both components are bolted together, but can be dismantled separately again.

1	Housing: Made of corrosion-resistant aluzinc sheet metal
2	Fan: Quiet axial fan with high-efficiency EC motor
3	Unit control box as part of the TopTronic® C control system
4	Heat exchanger: Heating coil consisting of copper tubes with aluminium fins
5	Outlet nozzle

Fig. B1: TopVent® NHV structure



1	Heating section
2	Outlet nozzle

Fig. B2: TopVent® NHV components

2.2 Operating modes

The TopVent® NHV 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® NHV unit can operate individually in a local operating mode: Off, Recirculation, Recirculation speed 1.

You will find a detailed description of the TopTronic® C control system in section M 'Control systems' of this handbook.

Code	Operating mode	Description
REC	**Recirculation** On/Off recirculation operation with TempTronic algorithm: during heat demand, 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)] for heat demand
REC1	**Recirculation speed 1** The same as REC, but the unit operates only at speed 1 (low air flow rate)	Fan ..... speed 1 [1)] Heating ..... on [1)] for heat demand
ST	**Standby** The unit is normally switched off. The following functions remain active:	
CPR	■ Cooling protection: If the room temperature drops below the set value for cooling protection, the unit heats up the room in recirculation operation.	Fan ..... speed 2 Heating ..... on
–	**Emergency operation** Emergency operation 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
L_OFF	**Off** (local operating mode) The unit is switched off.	Fan ..... off Heating ..... off

Table B1: TopVent® NHV operating modes

3 Technical data

3.1 Unit type reference

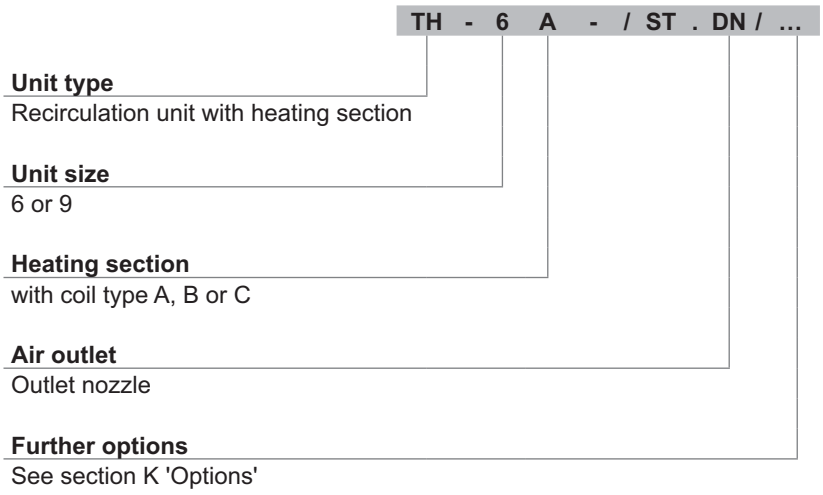


Table B2: Unit type reference

3.2 Application limits

Maximum operating pressure	800	kPa
Maximum heating medium temperature [1)]	90	°C
Maximum supply air temperature	60	°C
Maximum extract air temperature	50	°C

The units cannot be used in:
- Areas where there is danger of explosion
- Places with a corrosive or aggressive environment
- Damp locations
- Spaces with a large amount of dust

[1)] Design for higher temperatures on request

Table B3: Application limits

3.3 Flow rate, product parameters

Unit size		NHV-6			NHV-9		
Nominal air flow rate	m³/h	6000			9000		
Floor area reached	m²	537			946		
Static efficiency of the fans	%	48.5			43.0		
Coil type		**A**	**B**	**C**	**A**	**B**	**C**
Effective electric power input	kW	0.51	0.58	0.79	0.86	0.93	1.16

Table B4: TopVent® NHV technical data

3.4 Heat output

Notice
The performance data listed here applies to the most frequent design conditions. Use the selection program 'HK-Select' to calculate the performance data for other design data. You can download 'HK-Select' free of charge on the Internet.

Heating medium temperature			80/60 °C					60/40 °C				
Unit		t_{room}	Q	H_{max}	t_S	Δp_W	m_W	Q	H_{max}	t_S	Δp_W	m_W
Size	Type	°C	kW	m	°C	kPa	l/h	kW	m	°C	kPa	l/h
NHV-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
NHV-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_{room} = Room air temperature
Q = Heat output
H_{max} = Maximum mounting height
t_S = Supply air temperature
Δp_W = Water pressure drop
m_W = Water quantity

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

Table B5: TopVent® NHV heat outputs

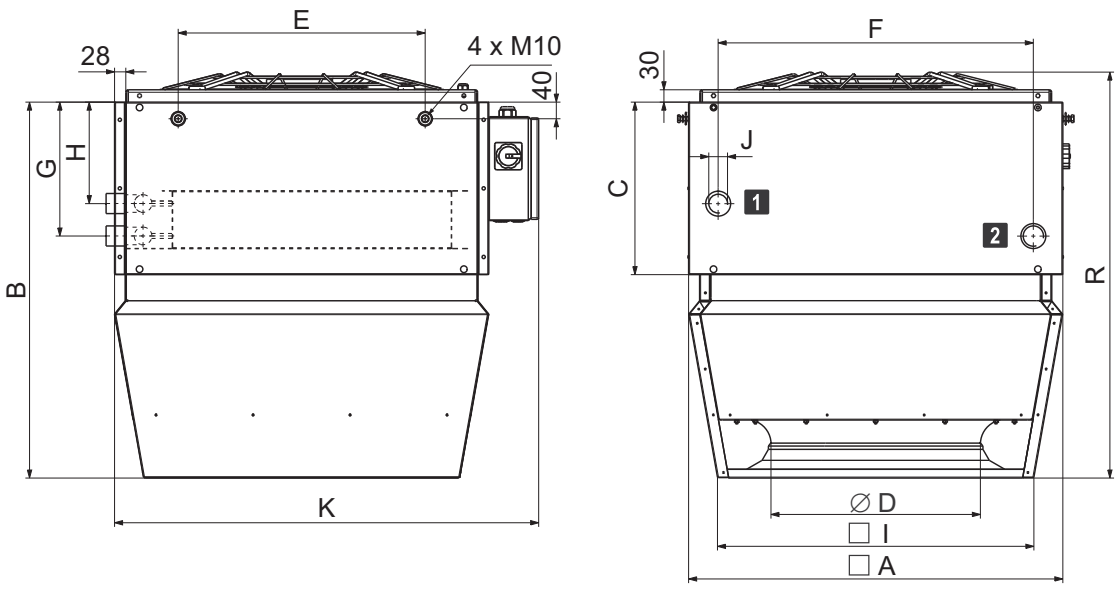
3.5 Sound data

Unit size			NHV-6			NHV-9		
Coil type			A	B	C	A	B	C
Sound pressure level (at a distance of 5 m) [1]		dB(A)	49	51	53	52	53	56
Total sound power level		dB(A)	71	73	75	74	75	78
Octave sound power level	63 Hz	dB	48	50	52	53	56	59
	125 Hz	dB	53	55	57	58	60	63
	250 Hz	dB	58	60	62	61	62	67
	500 Hz	dB	64	66	68	65	67	70
	1000 Hz	dB	68	70	72	70	70	73
	2000 Hz	dB	64	66	68	69	70	73
	4000 Hz	dB	57	59	61	63	65	68
	8000 Hz	dB	50	52	54	56	57	61

[1] with a hemispherical radiation pattern in a low-reflection room

Table B6: Sound levels

3.6 Dimensions and weights



Unit size		NHV-6			NHV-9		
A	mm	900			1100		
B	mm	905			1050		
C	mm	415			480		
∅ D	mm	500			630		
E	mm	594			846		
F	mm	758			882		
G	mm	322			367		
H	mm	244			289		
I	mm	760			935		
J	"	Rp 1¼ (internal)			Rp 1½ (internal)		
K	mm	1020			1220		
R	mm	977			1152		
Water content of the coil	Type	A	B	C	A	B	C
	l	3.1	3.1	6.2	4.7	4.7	9.4
Weight	kg	100	100	103	153	153	157

1	Return
2	Flow

Table B7: Dimensions and weights

4 Specification texts

4.1 TopVent® NHV – recirculation unit for heating high spaces with lower comfort requirements

Housing made of non-corrosive aluzinc sheet metal, standard equipment with 4 riveting nuts size M10 with hexagon bolts and washers for ceiling installation.
Heat exchanger made from copper tubes and aluminium fins, manifolds and distributor made from steel.
Fan unit consisting of maintenance-free, direct-drive axial fan with high-efficiency EC motor and balanced rotating wheel with aerodynamically shaped blades and serrated trailing edge.
Concentric outlet nozzle with a supply air sensor.

4.2 Options

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

Filter box
with 2 class G4 bag filters (according to DIN EN 779), with a differential pressure control device for monitoring the filter

Flat filter box
with 4 pleated class G4 cell filters (according to DIN EN 779) with a differential pressure control device for filter monitoring

Standard paint finish
in Hoval red (RAL 3000)

Paint finish as desired
in RAL colour No. _____

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

Hydraulic assembly diverting system
Prefabricated assembly for hydraulic diverting system, consisting of mixing valve, regulating valve, ball valve, automatic air vent and screw connections for connection to the unit and to the distributor circuit.

Mixing valves
Mixing valve with modulating rotary actuator, sized for the coil(s) in the unit.

Terminal box
Terminal box integrated into the side of the housing to connect supply voltage and accessories.

Electrical connection with TopTronic® C design
Control box fitted at the side of the housing as part of the TopTronic® C control system. The following components are installed:
- Unit controller
- Main switch
- Fuse for the electronics
- Transformer
- Connection terminals

The components of the unit are fully wired up.

4.3 TopTronic® C control systems

Freely configurable, zone-based control system ex-works for operation of decentralised Hoval indoor climate systems with optimised use of energy, suitable for demand-driven control of overall systems comprising up to 64 control zones each with up to 15 supply and extract air handling units or supply air units and 10 recirculation units.

System structure
- Unit controller: installed in the particular indoor climate unit
- Zone bus (Modbus): as serial connection of all unit controllers in one control zone with the zone controller; with robust bus protocol via shielded and twisted-pair bus line (bus cables provided by the client)
- Zone control panel with:
  - System operator terminal
  - Fresh air temperature sensor
  - Zone controllers and room air temperature sensors
  - All components for the electrical power supply and protection
- System bus (Ethernet): for connecting all zone controllers to one another and to the system operator terminal as well as, if appropriate, the building management system (bus cables provided by the client)

Operation
- TopTronic® C-ST as system operator terminal: touch panel for visualisation and control by web browser via HTML interface
- TopTronic® C-ZT as zone operator terminal: for simple on-site operation of a control zone (optional)
- Manual operating selector switch (optional)
- Manual operating selector button (optional)
- Operating of the units via building management system via standardised interfaces (optional)

Control functions
- Control of the supply air temperature using room supply air cascade control via sequential control of the energy recovery and the coils (depending on the unit type)
- Demand-driven control of the supply air and exhaust air volumetric flows with minimum and maximum limit depending on the room temperature or, optionally, the room air quality (for supply and extract air handling units)

- Control of the unit including the air distribution according to the specifications of the zone controller

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.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (for supply air units as well as supply and extract air handling units)
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

Options for the control system

Indoor climate unit
- Energy monitoring (for supply and extract air handling units)
- Door contact (for recirculation units in the 2-pipe system)
- Pump control for mixing or injection system
- Return temperature sensor

Zone control panel
- Alarm lamp
- Socket
- Additional room air temperature sensor
- Combination sensor room air quality, temperature and humidity
- External sensor values
- External set values
- Load shedding input
- Operating selector switch on terminal
- Operating selector button on terminal
- Power supply and safety relay
- Control of distributor pump(s), incl. power supply

4.4 System control for TopVent® plants

System control for operation of decentralised Hoval indoor climate systems with optimised use of energy, suitable for demand-driven control of TopVent® plants comprising 1 control zone with up to 6 supply air units and 10 recirculation units (power supply for the TopVent® units provided by the client).

System structure
- Unit controller: installed in the particular indoor climate unit
- Zone bus (Modbus): as serial connection of all unit controllers with the zone controller; with robust bus protocol via shielded and twisted-pair bus line (bus cables provided by the client)
- Zone control panel with:
  - Zone controller with operating panel C-SCT, making it simple to operate and monitor the system
  - Fresh air temperature sensor
  - Room temperature sensor
- External connections:
  - Enable heating
  - Trouble input heating
  - Enable cooling
  - Trouble input cooling
  - Collective trouble indicator
  - Forced off
  - Cooling lock switch
  - Changeover valves heating/cooling
  - Additional room temperature sensor (max. 1)
  - Operating selector switch on terminal (analogue)
  - Operating selector button on terminal (analogue)
  - External setpoint fresh air ratio

Control functions
- Control of the supply air temperature using room supply air cascade control
- Control of the unit including the air distribution according to the specifications of the zone controller

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.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (for supply air units)
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

Options for the control system

Indoor climate unit
- Door contact (for recirculation units in the 2-pipe system)
- Pump control for mixing or injection system
- Return temperature sensor

Zone control panel
- Additional room temperature sensor
- Bus interface for operating of the units via building management system

4.5 EasyTronic EC

Room temperature controller for TopVent® recirculation unit heaters and air curtains with manual setting of the room temperature setpoint, fan speed and, where applicable, air distribution with the Air-Injector, in addition, unit operation subject to a door contact switch, protection rating IP 30.