TopVent®

Hoval

Recirculation Units and Supply Air Units for Heating and Cooling High Spaces.

Safety

Safety

1 Symbols

Caution
You will find this symbol next to all safety notices that warn you of the danger to the life and limb of personnel. Take heed of these notices and behave with caution! At the same time the valid laws and generally valid safety and accident-prevention regulations must be heeded.

Attention
This symbol appears next to notices and regulations that have to be heeded to avoid damage to property.

Notice
This symbol designates information about economic use of the units or special tips.

2 Operational safety

TopVent® units are state-of-the-art and are safe to operate. Nevertheless, hazards may emanate from these units, if they are used incorrectly or not used as intended. Therefore:

- Please read and take heed exactly of the operating instructions for the units and safety instructions before unpacking, installing and commissioning them and prior to any maintenance!
- Store the operating instructions so that they are easily accessible.
- The units may only be installed, operated and maintained by authorized, trained and instructed skilled personnel.
- Observe any attached information and warning signs.

For installation and operation of the units the local safety and accident prevention regulations are valid in all cases; these have to be heeded and complied with!

3 Safety during maintenance

- Have any maintenance and repair work performed only by authorized skilled personnel or by our customer service department. Special regulations have to be heeded, e.g. when working on the electrical systems.
- Before commencing any maintenance work or trouble-shooting work switch off the unit via the main switch and secure it with a padlock against being switched back on.
- Before performing any maintenance work switch the isolation switch (optional) to the 'Off' position.

Only the fan is switched off by the isolation switch. Optional items may continue to carry a live voltage!

- When working in the TopVent® unit, be careful of any unprotected sharp metal edges.
- Renew immediately any damaged or removed instruction signs, warning signs and safety inscriptions.
- Do not obscure informational and warning signs by pasting or painting over them.
- Following maintenance work, professionally reassemble all dismantled protective devices.
- Unauthorized conversions or modifications to the unit can impair the safety of personnel and the operability of the unit and are therefore not allowed.
- Spare parts must comply with the technical requirements. Recommendation: use only genuine Hoval spare parts.

4 Information for an operating instruction session

According to the accident prevention regulations of some countries, the operator of equipment must, for the purpose of preventing industrial accidents, make arrangements to instruct the operating personnel about dangers that may occur and measures for their avoidance. This can be done with the help of operating instruction sessions. In addition to national regulations for accident prevention and environmental protection, an operating instruction session should include the most important points set out in these operating instructions.

TopVent® DHV

Recirculation unit for heating high spaces

TopVent® DHV
Use

1 Use

1.1 Intended use
The TopVent® DHV unit is used to heat high spaces in recirculation mode.
Proper use also includes observance of the installation, commissioning, operating, and maintenance conditions (operating instructions) specified by the manufacturer as well as the consideration of foreseeable abnormal behaviour and residual dangers.

1.2 User group
TopVent® DHV units may only be installed, operated and maintained by authorized and trained skilled personnel. The operating instructions are for English-speaking operating engineers and technicians as well as specialists in building, heating and air technology.

1.3 Operating Modes
TopVent® DHV units have the following operating modes:
- Recirculation mode at low fan speed
- Recirculation mode at high fan speed
- Standby
- Off

The application limits specified in the Section 'Technical Data' must be complied with.
Any other use or any additional use counts as being improper. The manufacturer shall not be responsible for any damages that may result thereby.

The standard version of the units is not suitable for operation in explosion-prone areas, in wet rooms or in rooms with a high dust incidence.

1.4 Residual dangers
Despite all of the precautionary measures taken, there are residual dangers; these are potential, non-apparent dangers, such as:
- Danger when working on the electrical system.
- When working on the TopVent® unit, parts (e.g. tools) can be dropped.
- Malfunctions due to defective parts
- Danger from hot water when working on the hot water supply.

2 Construction and operation

The TopVent® DHV unit is used to heat in recirculation mode; it was developed specially for use in high halls. The unit is installed under the ceiling. It takes in room air, heats it in the heating coil and blows it back into the room through the Air-Injector.
Thanks to its high performance and efficient air distribution the TopVent® DHV covers a large area. Therefore, compared to other systems, fewer units are needed to achieve the required conditions.
3 unit sizes, 2-speed fans, various coil types and a series of accessories make it possible to provide a customized solution for any hall. Special coils (hot water, steam, electric heating coils) are also available.

2.1 Unit construction

The TopVent® DHV consists of the heating section (with fan and heating coil) and the automatically adjustable vortex air distributor. Both components are bolted together, but can be dismantled separately again.

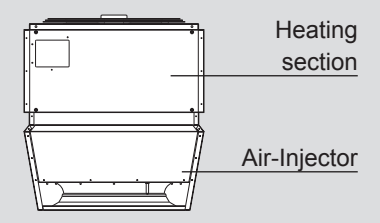
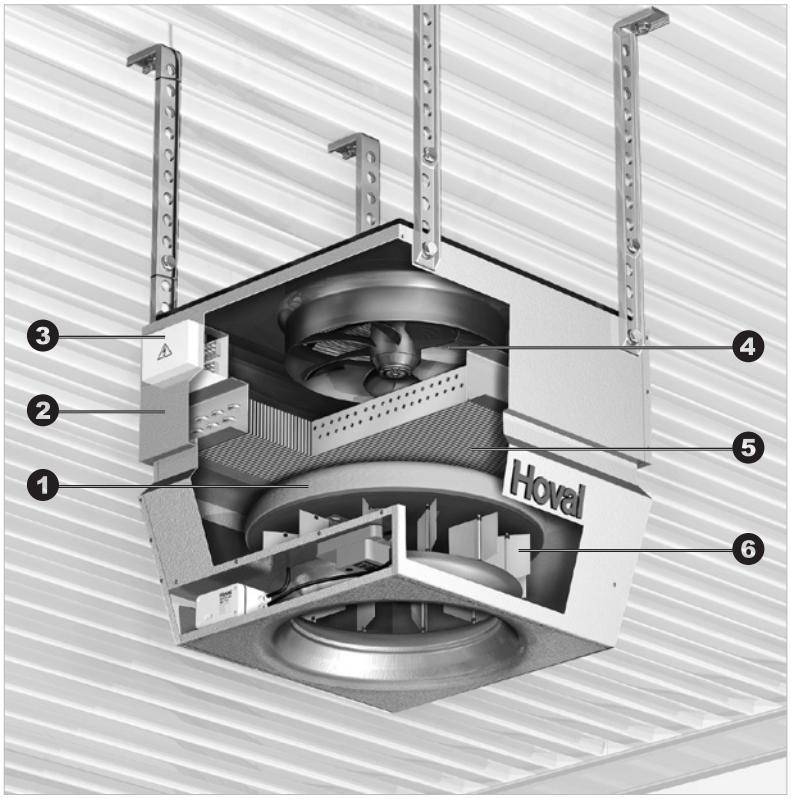


Fig. B1: Components of the TopVent® DHV

2.2 Air distribution with the Air-Injector

The patented air distributor – called the Air-Injector – is the core element. The discharge angle of the air is set using the adjustable vanes. It depends on the air flow rate (→ fan speed), the mounting height and the temperature difference between the supply air and room air. The air is therefore blown vertically downwards, conically or horizontally into the room. This ensures that

- with each TopVent® DHV unit a large area of the hall can be heated,
- the occupied area is draught-free,
- the temperature stratification in the room is reduced, thus saving energy.



❶	Sound attenuation cowl
❷	Housing: made of corrosion-resistant Aluzinc sheet metal
❸	Terminal box
❹	Fan maintenance-free, low-noise sickle fan with a low energy consumption
❺	Heat exchanger: LPHW heating coil consisting of copper tubes with aluminium fins
❻	Air-Injector: patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area

Fig. B2: Construction of the TopVent® DHV

TopVent® DHV
Technical data

3 Technical data

Unit type		DHV-6/A		DHV-6/B		DHV-6/C	
Fan speed		**1**	**2**	**1**	**2**	**1**	**2**
Rotational speed (nominal)	min^{-1}	690	900	690	900	690	900
Nominal air flow rate	m^3/h	4500	6100	4300	5900	3800	5300
Max. floor area reached [1)]	m^2	376	549	356	525	310	458
Power consumption (at 400 V / 50 Hz)	kW	0.48	0.69	0.48	0.69	0.48	0.69
Current consumption (at 400 V / 50 Hz)	A	0.78	1.25	0.78	1.25	0.78	1.25
Unit type		**DHV-9/A**		**DHV-9/B**		**DHV-9/C**	
Fan speed		**1**	**2**	**1**	**2**	**1**	**2**
Rotational speed (nominal)	min^{-1}	680	900	680	900	680	900
Nominal air flow rate	m^3/h	6600	8700	6600	8700	6000	7900
Max. floor area reached [1)]	m^2	610	900	610	900	537	783
Power consumption (at 400 V / 50 Hz)	kW	0.70	0.98	0.70	0.98	0.70	0.98
Current consumption (at 400 V / 50 Hz)	A	1.15	1.75	1.15	1.75	1.15	1.75
Unit type		**DHV-10/A**		**DHV-10/B**		**DHV-10/C**	
Fan speed		**1**	**2**	**1**	**2**	**1**	**2**
Rotational speed (nominal)	min^{-1}	660	860	660	860	660	860
Nominal air flow rate	m^3/h	7500	9700	7500	9700	6900	8900
Max. floor area reached [1)]	m^2	727	1058	727	1058	648	931
Power consumption (at 400 V / 50 Hz)	kW	0.99	1.53	0.99	1.53	0.99	1.53
Current consumption (at 400 V / 50 Hz)	A	1.77	3.35	1.77	3.35	1.77	3.35

[1)] Mounting height H_{max} = 11 m with a temperature difference between supply air and room air of up to 30 K

Table B1: Technical data of the TopVent® DHV

Type designation code

DHV – 6 / A

Unit type
TopVent® DHV

Unit size
6, 9 or 10

Heat exchanger
Coil type A, B or C

Table B2: Type designation code

Unit type			DHV-6		DHV-9		DHV-10	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Sound pressure level (at a distance of 5 m) [1)]		dB(A)	47	53	52	58	61	68
Total sound power level		dB(A)	69	75	74	80	83	90
Octave sound power level	63 Hz	dB	75	79	79	83	94	99
	125 Hz	dB	73	79	74	83	87	94
	250 Hz	dB	68	76	74	79	87	94
	500 Hz	dB	64	70	68	74	80	87
	1000 Hz	dB	64	71	70	75	77	84
	2000 Hz	dB	61	68	68	75	71	78
	4000 Hz	dB	54	62	62	68	64	72
	8000 Hz	dB	47	55	55	62	55	63

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

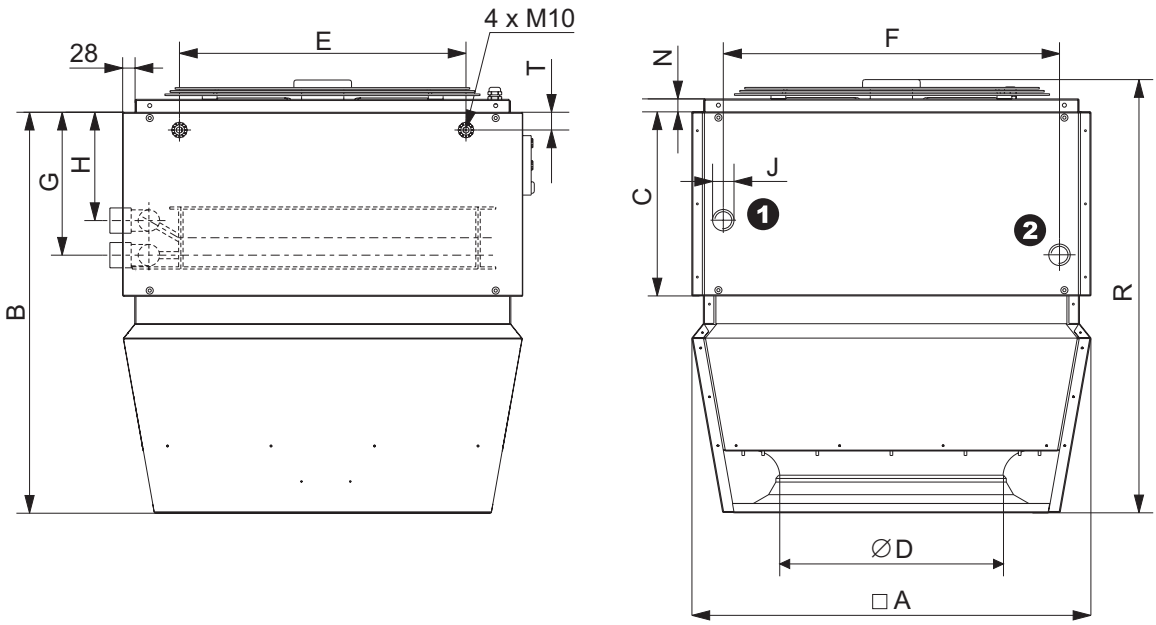
Table B3: Sound power levels of the TopVent® DHV

Air inlet temperature				15 °C					20 °C				
Size	LPHW °C	Type	St.	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h
DHV-6	80/60	A	1	29	10.2	5	34	1261	27	10.7	4	37	1139
			2	35	14.3	7	31	1495	32	15.1	6	35	1351
		B	1	40	8.3	9	42	1721	36	8.8	8	44	1554
			2	49	11.7	13	39	2090	44	12.3	11	42	1886
		C	1	55	6.2	7	56	2351	50	6.5	6	57	2124
			2	70	8.6	10	53	3018	64	9.0	9	54	2726
	60/40	A	1	17	13.0	2	26	737	14	14.3	1	29	613
			2	20	18.4	3	25	873	17	20.2	2	28	725
		B	1	23	10.6	4	31	1003	19	11.6	3	33	831
			2	28	15.0	5	29	1213	23	16.6	4	31	1005
		C	1	33	7.8	3	40	1399	27	8.5	2	41	1169
			2	42	10.8	4	38	1787	35	11.9	3	39	1487
DHV-9	80/60	A	1	49	10.0	5	36	2089	44	10.6	4	39	1887
			2	57	13.6	6	34	2452	52	14.4	5	37	2213
		B	1	61	9.0	7	42	2636	55	9.5	6	44	2379
			2	73	12.1	10	39	3125	66	12.8	8	42	2819
		C	1	86	6.9	6	56	3689	78	7.2	5	57	3332
			2	106	9.0	9	53	4535	96	9.5	7	55	4096
	60/40	A	1	28	12.8	2	27	1217	24	14.1	1	30	1009
			2	33	17.5	2	26	1424	28	19.3	2	29	1181
		B	1	36	11.5	3	31	1532	30	12.7	2	33	1268
			2	42	15.7	4	29	1810	35	17.3	3	31	1497
		C	1	51	8.6	2	39	2193	43	9.4	2	40	1831
			2	63	11.4	4	38	2684	52	12.5	3	39	2234
DHV-10	80/60	A	1	53	11.5	5	35	2252	47	12.2	4	38	2033
			2	61	15.4	7	33	2605	55	16.3	6	36	2352
		B	1	67	10.3	8	40	2855	60	10.9	7	43	2576
			2	78	13.7	11	38	3333	70	14.5	9	41	3007
		C	1	96	7.9	7	55	4102	86	8.3	6	56	3705
			2	115	10.2	10	52	4944	104	10.7	8	54	4465
	60/40	A	1	31	14.8	2	27	1310	25	16.3	2	30	1086
			2	35	19.9	3	25	1513	29	21.9	2	29	1254
		B	1	39	13.3	3	30	1656	32	14.6	2	32	1370
			2	45	17.7	4	28	1928	37	19.5	3	31	1594
		C	1	57	9.9	3	39	2433	47	10.9	2	40	2029
			2	68	12.9	4	37	2921	57	14.2	3	38	2428

Legend:
Type = Type of heating coil
St. = Fan speed
Q = Heating output
H_{max} = Max. mounting height
Δp_W = Water pressure drop
t_S = Supply air temperature
m_W = Water flow rate

Table B4: Heating outputs of the TopVent® DHV

TopVent® DHV
Technical data



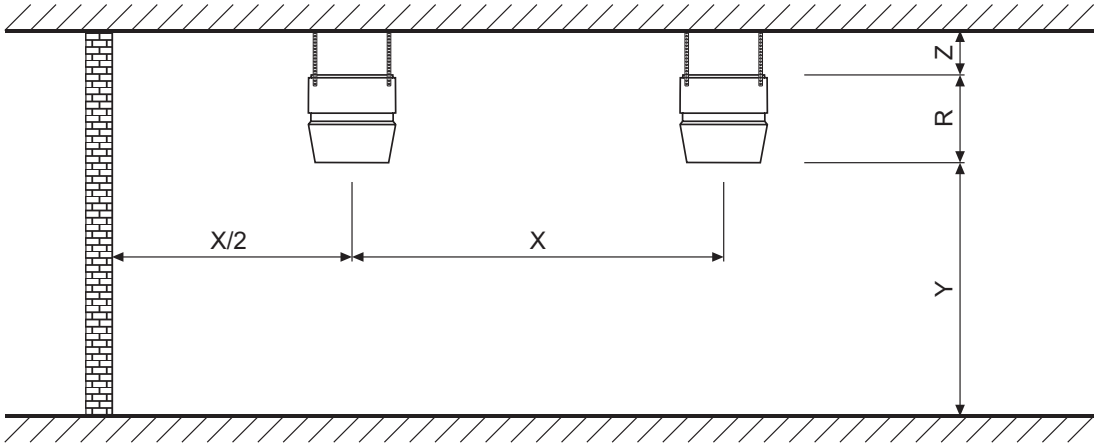
Unit type		DHV-6			DHV-9			DHV-10		
A	mm	900			1100			1100		
B	mm	905			1050			1170		
C	mm	415			480			601		
Ø D	mm	500			630			630		
E	mm	594			846			846		
F	mm	758			882			882		
G	mm	322			367			488		
H	mm	244			289			410		
J	"	1¼ (BSP female)			1½ (BSP female)			1½ (BSP female)		
N	mm	30			30			27		
R	mm	977			1120			1252		
T	mm	40			40			40		
Weight	kg	97			148			182		
Water content of the coil	Type	A	B	C	A	B	C	A	B	C
	l	3.1	3.1	6.2	4.7	4.7	9.4	4.7	4.7	9.4

1	Return
2	Flow

Table B5: Dimensions and weights of the TopVent® DHV

Max. operating pressure	800	kPa
Maximum heating medium temperature	120	°C
Maximum supply air temperature	60	°C
Maximum ambient temperature	40	°C

Table B6: Application limits of the TopVent® DHV



Unit type			DHV-6/A		DHV-6/B		DHV-6/C	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Unit height R		m	0.977	0.977	0.977	0.977	0.977	0.977
Unit clearance X	min.	m	10	12	10	11	10	11
	max.	m	19	23	19	23	18	21
Mounting height Y [1)]	min.	m	4	4	4	4	4	4
Distance from ceiling Z	min.	m	0.3	0.3	0.3	0.3	0.3	0.3
Unit type			DHV-9/A		DHV-9/B		DHV-9/C	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Unit height R		m	1.12	1.12	1.12	1.12	1.12	1.12
Unit clearance X	min.	m	12	14	12	14	12	13
	max.	m	25	30	25	30	23	28
Mounting height Y [1)]	min.	m	5	5	5	5	5	5
Distance from ceiling Z	min.	m	0.4	0.4	0.4	0.4	0.4	0.4
Unit type			DHV-10/A		DHV-10/B		DHV-10/C	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Unit height R		m	1.252	1.252	1.252	1.252	1.252	1.252
Unit clearance X	min.	m	13	15	13	15	12	14
	max.	m	27	33	27	33	25	31
Mounting height Y [1)]	min.	m	5	5	5	5	5	5
Distance from ceiling Z	min.	m	0.4	0.4	0.4	0.4	0.4	0.4

1) The minimum height can be reduced by 1 m in each case using the 'Air outlet box' option (see Section K 'Options').

Table B7: Minimum and maximum distances

TopVent® DHV
Technical data

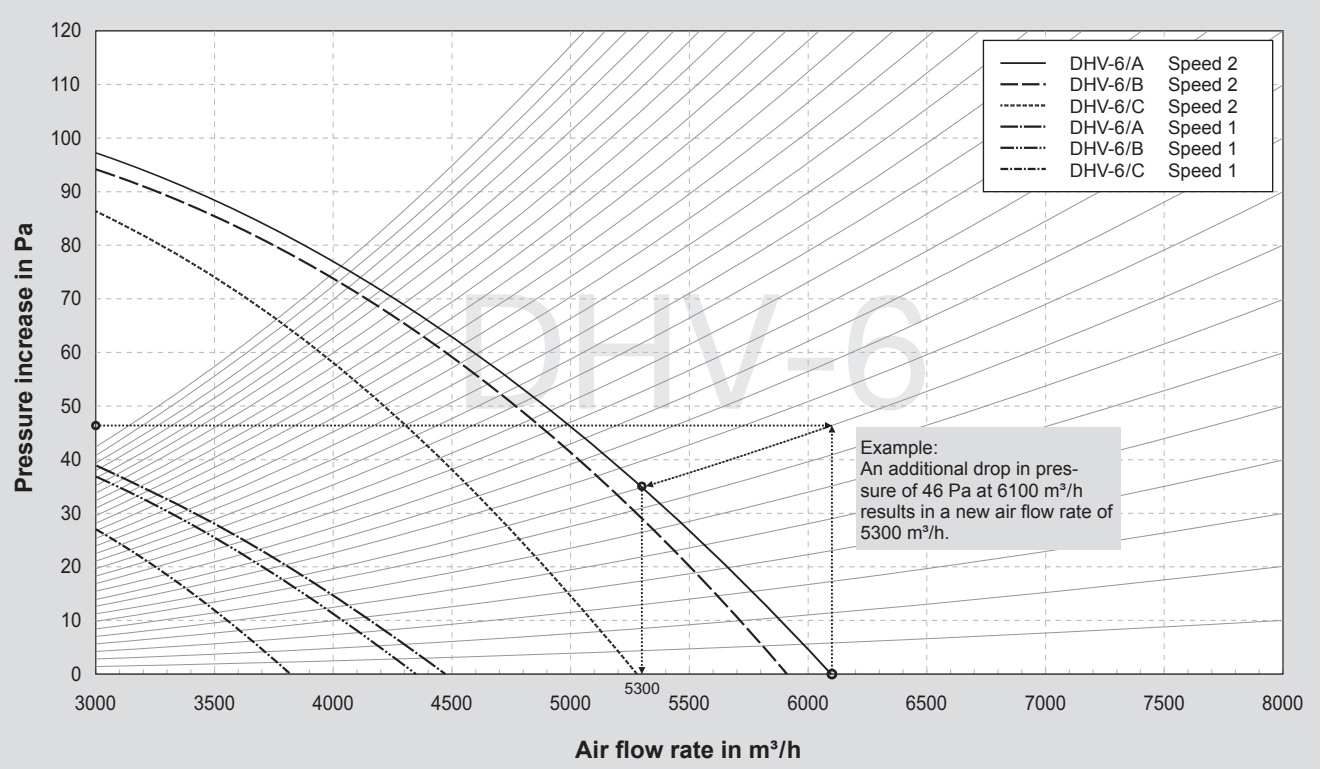


Diagram B1: Air flow rate for TopVent® DHV-6 with additional pressure drop

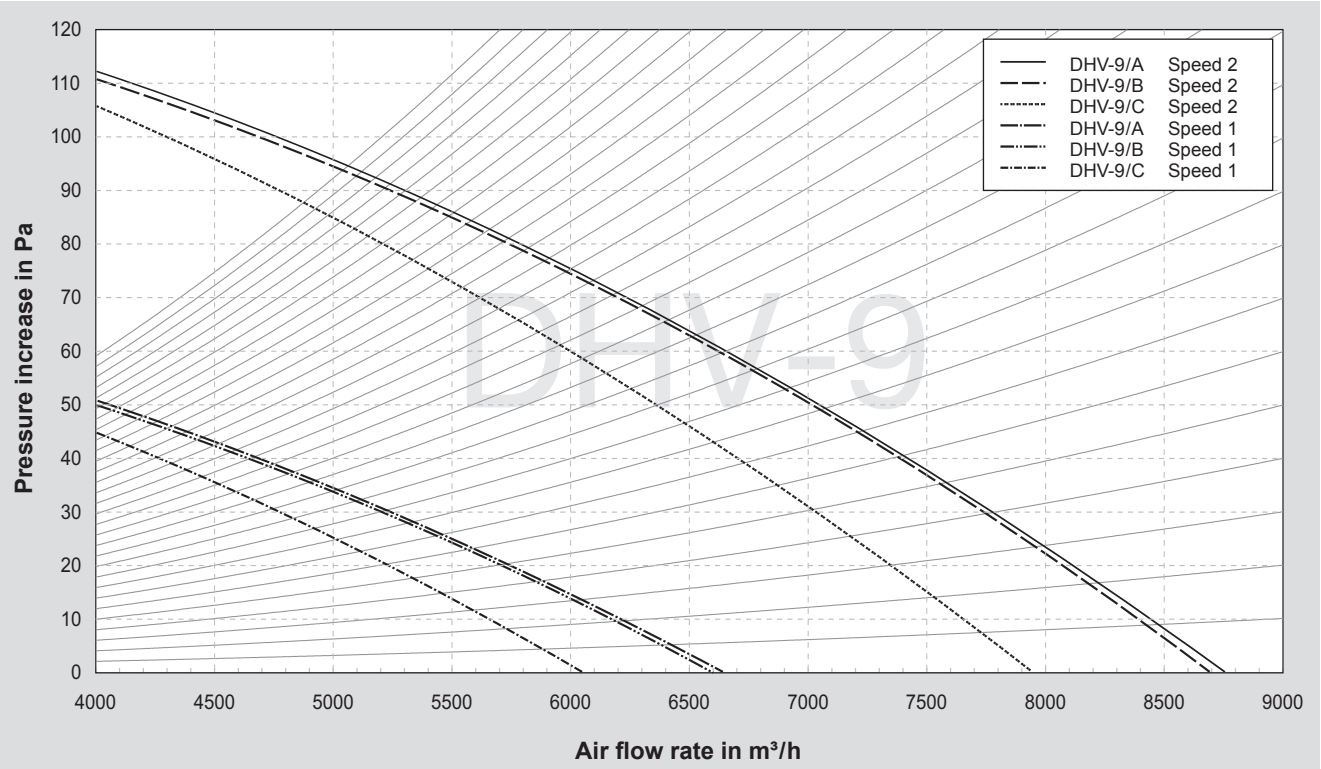


Diagram B2: Air flow rate for TopVent® DHV-9 with additional pressure drop

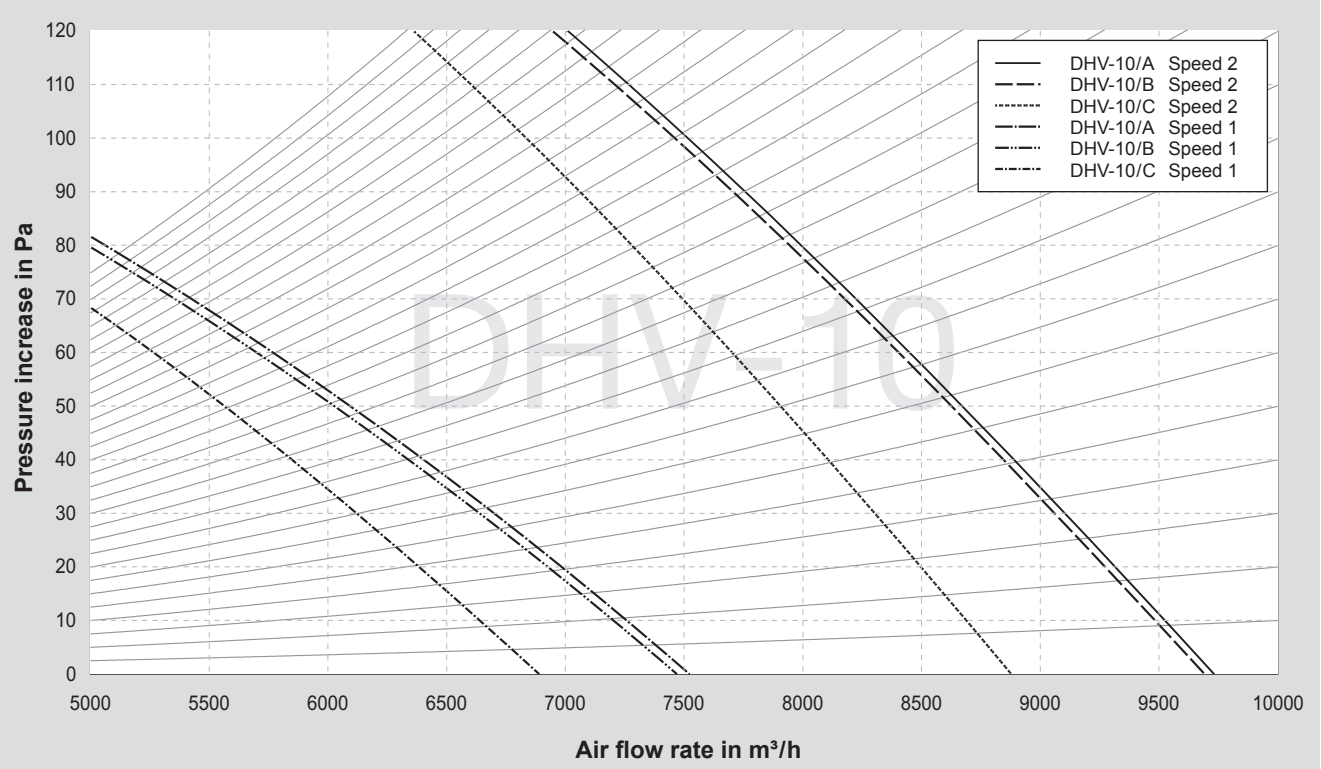


Diagram B3: Air flow rate for TopVent® DHV-10 with additional pressure drop

TopVent® DHV
Design example

4 Design example

The performance data for the most frequent design conditions are specified in Section 3 'Technical Data'. Use the selection program 'HK-Select' to calculate the performance data for other design data (room temperature, heating medium temperature). You can download 'HK-Select' free of charge on the Internet.

Input data
- Geometry of the room (plan)
- Mounting height (= distance between the floor and lower edge of the TopVent® unit)
- Heat load
- Desired room temperature
- Heating medium temperature (flow/return)
- Comfort requirements (acoustic)

Example
Geometry.....50 x 70 m
Mounting height.....12 m
Heating load .....350 kW
Room temperature.....20 °C
Heating medium temperature....80/60 °C
Comfort requirements.....Standard

Comfort requirements
Define the fan speed in accordance with the acoustic requirements:
Low noise level → fan speed 1
Normal noise level → fan speed 2

Standard → fan speed 2

Mounting height
- With the minimum mounting height (Table B7) check which units can be used.
- With the maximum mounting height (Table B4) check which units can be used.
- Strike units which are not adequate.

DHV-6/A	DHV-9/A	DHV-10/A
DHV-6/B	DHV-9/B	DHV-10/B
~~DHV-6/C~~	~~DHV-9/C~~	~~DHV-10/C~~

Minimum number
a) Minimum number based on the area
In table B1 it is specified what maximum floor area can be covered by the TopVent® DHV. For a known floor area it is then possible to calculate – for each unit size – the minimum number of units required.
b) Minimum number based on length x width
Depending on the geometry of the hall and in relation to its length and width a certain number of units is required. This can be calculated from the figures for maximum distances between the units and between them and the wall (see Table B7).
c) Minimum number based on the heating load
Depending on the total heat output required, a minimum number of units can be calculated for each unit size (see Table B4).
The highest number from results a), b) and c) is the actual minimum number required.

Calculate the minimum number of units according to a), b) and c) and enter it in a table for each type of unit. Take the highest value as the minimum quantity.

Type	a)	b)	c)	
DHV-6/A	7	9	11	11
DHV-6/B	7	6	8	8
DHV-6/C	None			–
DHV-9/A	4	6	7	7
DHV-9/B	4	6	6	6
DHV-9/C	None			–
DHV-10/A	4	6	7	7
DHV-10/B	4	6	5	6
DHV-10/C	None			–

TopVent® DHV
Design example

Definitive number of units Choose the final solution from the remaining possibilities, depending on the geometry of the hall and the costs.	6 units of DHV-9/B

TopVent® DHV
Options

5 Options

TopVent® DHV units can be adapted to the requirements of a particular project by means of a series of options. You will find a detailed description of all optional components in Section K 'Options' of this handbook.

Paint finish	at no extra cost in the standard Hoval colours red/orange or for an additional charge in any colour required
Suspension set	for mounting the unit on ceiling
Isolation switch	on/off switch that can be operated from the outside
Actuator for Air-Injector	for adjustment of the Air-Injector
Filter box	to filter recirculation air
Acoustic cowl	to reduce the noise level in the room (reduced noise emission from the Air-Injector)
Recirculation silencer	to reduce noise levels in the room (reduced noise reflection from the ceiling)
Air outlet box	for use of the TopVent® unit in low-ceiling halls
Explosion-proof design	for use of the TopVent® unit in explosion-prone areas (zone 1 and zone 2), for DHV-6 and DHV-9 only

6 Control systems

For the TopVent® DHV there are components for control of the room temperature and of the air distribution that have been specially developed by Hoval and optimally matched to the devices. You will find a detailed description of these components in Section L 'Control Systems' of this handbook.

6.1 Room temperature control

TempTronic RC	This is a programmable, electronic temperature controller for fully automatic operation. Its control algorithm with fuzzy logic ensures extremely small control deviations and minimizes energy consumption.
EasyTronic	This is a simple temperature controller without a time switch. The room's setpoint temperature is adjusted manually and the desired fan speed is selected by means of a switch.

6.2 Control of the air distribution

Automatic control by the TempTronic RC	The TempTronic RC also controls the air distribution in accordance with the changing operating conditions (i.e. depending on the fan speed and on the temperature difference between the supply air and room air).
Manual control by means of a potentiometer	In applications in which the operating conditions only seldom change or when not such high comfort requirements are made, the air distribution can be manually controlled by a potentiometer.
Fixed setting	In cases where the air distribution always takes place under the same conditions (constant supply air temperature, constant air flow rate), it can have a fixed setting.

In indoor climate systems in which TopVent® DHV units are used together with RoofVent® fresh air handling units, the Hoval DigiNet system assumes all the control and regulation functions.

7 Transport and installation

Transport and assembly work to be carried out only by trained specialists!

A hoist is required for transport and installation of the components! Do not tilt the unit or lay it flat!

7.1 Installation

For ceiling installation the units are equipped as standard with 4 M10 rivet nuts with hexagon head bolts and washers. With these bolts and the height-adjustable suspension set (optional) the unit can be easily fastened to the ceiling.

The rivet nuts are only dimensioned for the unit's own weight. Do not fasten any additional loads!

The rivet nuts cannot take a bending moment; no eyebolts may be used!

Other fastenings with flat bars, perforated bars and angle section, but with steel cables as well, are also possible, however, the following instructions have to be heeded without fail:

- Lateral, inclined suspensions are allowed up to a maximum angle of 45°.
- The unit must be installed horizontally!

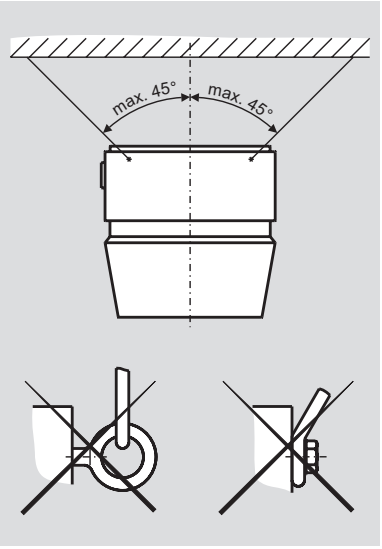


Fig. B3: Suspension of the TopVent® DHV

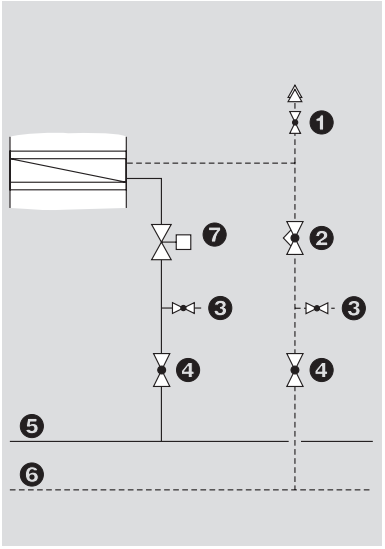
7.2 Hydraulic Installation

Have the hydraulic installation performed by skilled personnel only!

- Combine units that run under the same operating conditions (room temperature, heat gain, operating time etc.) to form a control group.
- Warm or hot water up to a maximum of 120 °C can be used as the heating medium. For energy saving purposes a pre-regulation of the distributor is possible; however, it has to be ensured that the heat requirement of the individual heating coils can be met in any case.
- Connect the heating coils in accordance with Fig. B4. Depending on local circumstances it has to be checked whether compensators for the feed and return lines for compensation of the linear expansion and/or articulated connections are required for the units.

The coil cannot bear any loads, e.g. by means of the flow or return lines!

- Hydraulically balance the individual units with one another so that uniform pressure admission is ensured.



❶	Vent with shut-off device
❷	Flow control valve
❸	Drain cocks
❹	Shut-off valves
❺	Flow
❻	Return
❼	Control valve

Fig. B4: Connection of the heating coil

7.3 Electrical installation

The electrical connection must be performed up to the unit by a certified skilled electrician. The applicable regulations have to be observed (e.g. EN 60204-1).

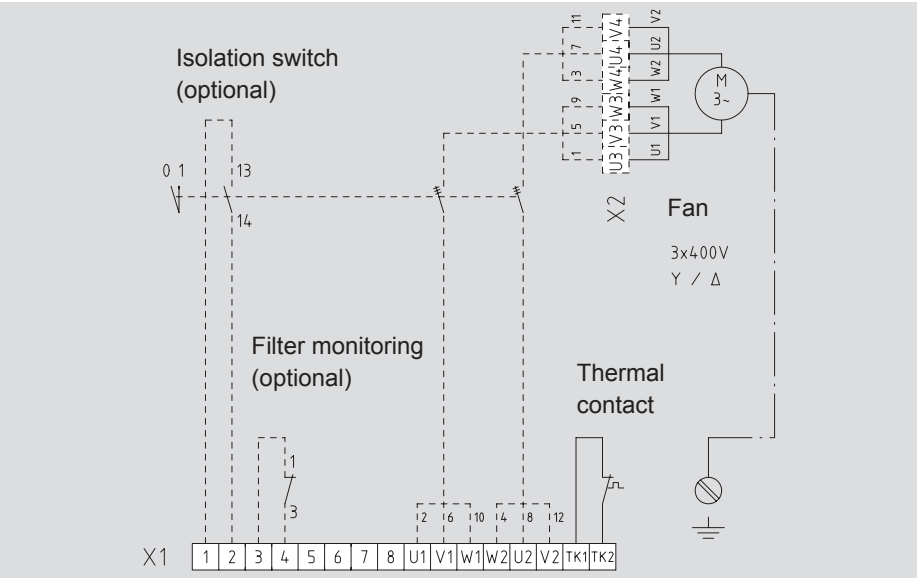
The unit is supplied ready to operate.

- Check whether the local operating voltage, frequency and fuse protection coincide with the data on the type plate. If there are any discrepancies, the unit must not be connected!
- For long leads the cable cross-sections must be selected according to the technical regulations, e. g. VDE 0100.
- Perform the electrical installation work in accordance with the wiring diagram of the control system.
- Connect the TopVent® DHV units in accordance with the terminal diagram.

Connect the thermal contacts that are built into the motor. Only then is the motor protected against overheating.

- Do not forget the main switch for the complete system (control system and units).
- Several TopVent® units can be connected in by means of a parallel circuit.

Wire the thermal contacts and isolation switch indicator in series!



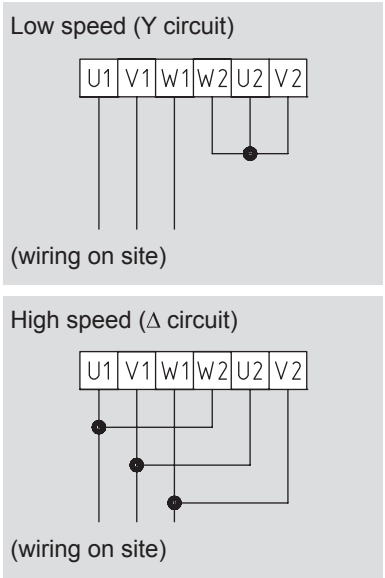


Fig. B5: Terminal diagram for TopVent® DHV

TopVent® DHV
Specification texts

8 Specification texts

8.1 TopVent® DHV
Recirculation unit for heating high spaces

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 of copper tubes and aluminium fins, manifolds and distributor made of steel.
Fan unit consisting of a 2-speed, 3-phase external rotor motor with pressure-resistant aluminium sickle-shaped blades, maintenance-free and quiet, with a high degree of efficiency. Motor protection through built-in thermal contacts. Protection class IP54.
Terminal box integrated on the side inside of the housing to connect supply voltage and accessories.
Vortex air distributor with a concentric outlet nozzle, 12 adjustable guide vanes, sound attenuation cowl and supply air temperature sensor.

Technical data

Fan speed	1	2	
Nominal air flow rate	_____	_____	m³/h
Floor area reached	_____	_____	m²
Mounting height	_____	_____	m
Nominal heating output	_____	_____	kW
with LPHW	_____	_____	°C
and air inlet temperature	_____	_____	°C
Power consumption	_____	_____	kW
Current consumption	_____	_____	A
Voltage	400 V / 50 Hz		

DHV-6/A	DHV-6/B	DHV-6/C
DHV-9/A	DHV-9/B	DHV-9/C
DHV-10/A	DHV-10/B	DHV-10/C

8.2 Options

■ Standard paint finish SL
in the Hoval colours red (RAL 3000) and orange (RAL 2008)

■ Paint finish as desired
in RAL colour No. _____

■ Suspension set AHS
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.

■ Isolation switch RS
in the terminal box of the TopVent® unit

■ Actuator for Air-Injector VT-AS
with cable and plug for adjustment of the Air-Injector

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

■ Flat filter box FFK
with 4 pleated cell filters (according to DIN EN 779), with a pressure difference control device for filter monitoring

■ Acoustic cowl AHD
consisting of a sound attenuation cowl of large volume and a screen with a lining of sound attenuation material, insertion attenuation 4 dB(A)

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

■ Air outlet box AK
made of Aluzinc sheet metal, with 4 adjustable outlet grilles (replaces the Air-Injector)

8.3 Control systems

■ Room temperature control and automatic control of the air distribution by the TempTronic RC
Programmable regulation system with menu-guided operator control for fully-automatic operation of the TopVent® units:
- TempTronic RC, operator control terminal as a wall unit in a plastic housing with an integrated room temperature sensor
- RC station RCS for the power supply and control of several TopVent® units in parallel operation
- RC single station RCE for the power supply and control of a single TopVent® unit
- Actuator VT-AS for automatic adjustment of the air blow-out direction from vertical to horizontal
- Optional module OM for the control of additional functions, as a wall unit in a plastic housing
- Room temperature sensor RF for the connection in place of the room temperature sensor that is integrated into the TempTronic RC, in a plastic housing for wall-mounted installation
- Room temperature mean value MRT4, 4 room temperature sensors for installation in the occupied area

■ Room temperature control by means of EasyTronic
Single switching device with 2-point regulation and manual changeover between fan speed levels 1 and 2

- EasyTronic ET, switching device for heating mode, as a wall unit in a plastic housing, including room thermostat

■ Manual control of the air distribution by means of the potentiometer
Manual control by means of potentiometer and actuator for adjustment of the air blow-out direction from vertical to horizontal:

- Potentiometer wall unit PMS-W
- Potentiometer for installation into a control panel PMS-S
- Actuator VT-AS
- Transformer TA for a maximum of 7 actuators

TopVent® DKV

Recirculation unit for heating and cooling high spaces

C

TopVent® DKV
Use

1 Use

1.1 Intended use
The TopVent® DKV unit is used to heat and cool high spaces in recirculation mode.
Proper use also includes observance of the installation, commissioning, operating, and maintenance conditions (operating instructions) specified by the manufacturer as well as the consideration of foreseeable abnormal behaviour and residual dangers.

1.2 User group
TopVent® DKV units may only be installed, operated and maintained by authorized and trained skilled personnel. The operating instructions are for English-speaking operating engineers and technicians as well as specialists in building, heating and air technology.

1.3 Operating Modes
TopVent® DKV units have the following operating modes:
- Recirculation mode at low fan speed
- Recirculation mode at high fan speed
- Standby
- Off

The application limits specified in the Section 'Technical Data' must be complied with.
Any other or any additional use counts as being improper. The manufacturer shall not be responsible for any damages that may result thereby.

The units are not suitable for operation in explosion-prone areas, in wet rooms or in rooms with a high dust incidence.

1.4 Residual dangers
Despite all of the precautionary measures taken, there are residual dangers; these are potential, non-apparent dangers, such as:
- Danger when working on the electrical system.
- When working on the TopVent® unit, parts (e.g. tools) can be dropped.
- Malfunctions due to defective parts
- Danger from hot water when working on the hot water supply.

2 Construction and operation

The TopVent® DKV unit is used to heat and cool in recirculation mode; it was developed specially for use in high halls. The unit is installed under the ceiling. It takes in room air, heats or cools it and blows it back into the room through the Air-Injector.
Thanks to its high performance and efficient air distribution the TopVent® DKV covers a large area. Therefore, compared to other systems, fewer units are needed to achieve the required conditions.
2 unit sizes, 2-speed fans, various coil types and a series of accessories make it possible to provide a customized solution for any hall.

2.1 Unit construction

The TopVent® DKV consists of the heating/cooling section (with fan, heat exchanger and integrated condensate separator for the condensate incurred) and the automatically adjustable vortex air distributor - the Air-Injector. The heating/cooling section is insulated to avoid condensation on the external surfaces. Both components are bolted together, but can be dismantled separately again.

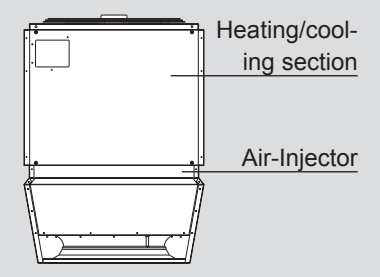
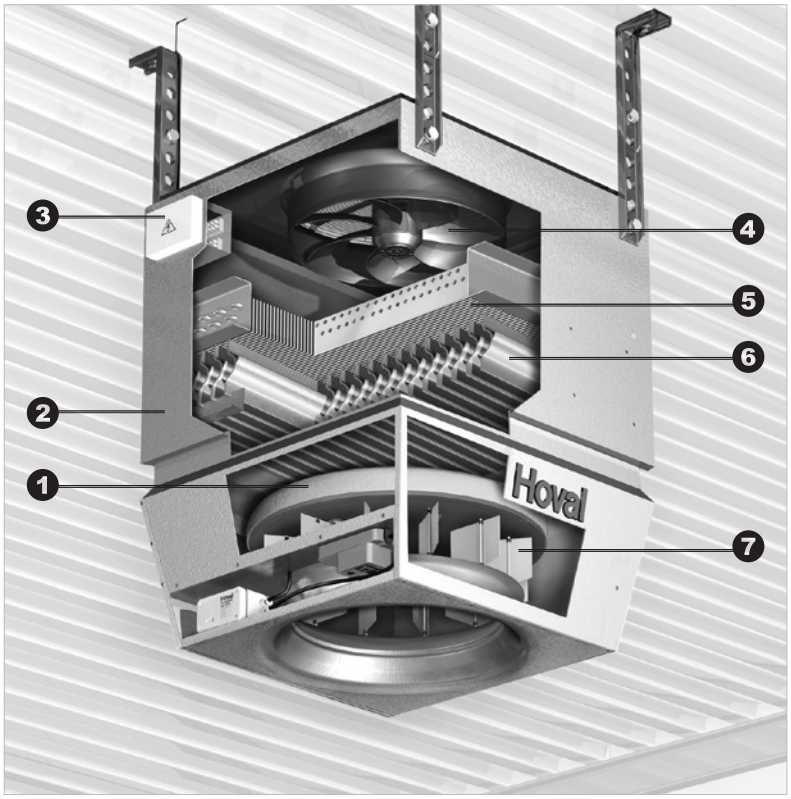


Fig. C1: Components of the TopVent® DKV unit

2.2 Air distribution with the Air-Injector

The patented air distributor – called the Air-Injector – is the core element. The air discharge angle is set by means of the adjustable guide vanes. It depends on the air flow rate (→ fan speed), the mounting height and the temperature difference between the supply air and room air. The air is therefore blown vertically downwards, conically or horizontally into the room. This ensures that

- with each TopVent® DKV unit a large area of the hall is heated or cooled,
- no draughts occur in the occupied area,
- the temperature stratification in the room is reduced, thus saving energy.



❶	Sound attenuation cowl
❷	Housing: made of corrosion-resistant Aluzinc sheet metal; the heating/cooling section is insulated
❸	Terminal box
❹	Fan maintenance-free, low-noise sickle fan with a low energy consumption
❺	Heat exchanger: LPHW/LPCW coil consisting of copper tubes with aluminium fins
❻	Condensate separator: with condensate connection
❼	Air-Injector: patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area

Fig. C2: Construction of the TopVent® DKV

TopVent® DKV
Technical data

3 Technical data

Unit type		DKV-6/C		DKV-9/C		DKV-9/D	
Fan speed		**1**	**2**	**1**	**2**	**1**	**2**
Rotational speed (nominal)	min^{-1}	680	900	660	860	660	860
Nominal air flow rate	m^3/h	3900	4900	6600	8700	6200	8100
Max. floor area reached [1)]	m^2	319	416	610	900	561	811
Power consumption (at 400 V / 50 Hz)	kW	0.70	0.98	1.00	1.65	1.00	1.65
Current consumption (at 400 V / 50 Hz)	A	1.15	1.75	1.80	3.50	1.80	3.50

[1)] Mounting height H_{max} = 11 m with a temperature difference between supply air and room air of up to 30 K

Table C1: Technical data of the TopVent® DKV

Unit type reference

DKV – 6 / C

Unit type
TopVent® DKV

Unit size
6 or 9

Heat exchanger
Coil type C or D

Table C2: Type designation code

Unit type			DKV-6		DKV-9	
Fan speed			**1**	**2**	**1**	**2**
Sound pressure level (at a distance of 5 m) [1)]		dB(A)	51	57	60	67
Total sound power level		dB(A)	73	79	82	89
Octave sound power level	63 Hz	dB	78	82	93	98
	125 Hz	dB	73	82	86	93
	250 Hz	dB	73	78	86	93
	500 Hz	dB	67	73	79	86
	1000 Hz	dB	69	74	76	83
	2000 Hz	dB	67	74	70	77
	4000 Hz	dB	61	67	63	71
	8000 Hz	dB	54	61	54	62

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

Table C3: Sound power values of the TopVent® DKV

Air inlet temperature				15 °C					20 °C				
Size	LPHW °C	Type	St.	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h
DKV-6	80/60	C	1	56	6.4	7	56	2399	51	6.7	6	57	2167
			2	66	7.9	9	54	2850	60	8.4	8	55	2574
	60/40	C	1	33	8.0	3	39	1427	28	8.7	2	40	1192
			2	39	10.0	4	38	1689	33	10.9	3	39	1407
DKV-9	80/60	C	1	93	7.5	7	55	3967	84	7.9	6	56	3583
			2	113	9.9	10	52	4864	102	10.5	8	54	4392
		D	1	– [1]	–	–	–	–	–	–	–	–	–
			2	–	–	–	–	–	–	–	–	–	–
	60/40	C	1	55	9.5	3	39	2355	46	10.4	2	40	1965
			2	67	12.6	4	37	2875	56	13.9	3	38	2390
		D	1	63	8.2	3	44	2693	53	9.0	2	44	2259
			2	78	10.7	4	43	3358	66	11.7	3	43	2813

[1] – These operating conditions are not permissible, because the maximum supply air temperature of 60 °C is exceeded.

Legend:
Type = Type of heating/cooling coil
St. = Fan speed
Q = Heating output
H_{max} = Max. mounting height
Δp_W = Water pressure drop
t_S = Supply air temperature
m_W = Water flow rate

Table C4: Heating outputs of the TopVent® DKV

TopVent® DKV
Technical data

Cooling medium temp.				6/12 °C						8/14 °C					
Type	t_{AI}	rh	St.	Q_{sen}	Q_{tot}	Δp_W	t_S	m_W	m_C	Q_{sen}	Q_{tot}	Δp_W	t_S	m_W	m_C
	°C	%		kW	kW	kPa	°C	l/h	kg/h	kW	kW	kPa	°C	l/h	kg/h
DKV-6/C	24	50	1	14	16	8	14	2256	3	12	12	5	15	1722	0
			2	17	18	10	14	2608	2	14	14	6	16	2033	0
		70	1	14	26	18	14	3655	17	12	20	12	15	2918	13
			2	16	30	24	15	4244	20	14	24	16	16	3376	14
	28	50	1	18	26	19	15	3785	12	16	21	13	16	3045	7
			2	22	31	25	15	4395	13	19	25	17	17	3526	8
		70	1	18	39	39	15	5559	30	16	34	30	17	4805	26
			2	20	45	51	16	6462	35	19	39	39	17	5574	29
DKV-9/C	24	50	1	23	26	7	14	3679	4	20	20	5	15	2836	0
			2	29	30	10	15	4361	3	24	24	7	16	3454	0
		70	1	22	42	18	14	5978	28	19	33	12	16	4763	20
			2	27	50	24	15	7122	32	23	39	16	16	5646	23
	28	50	1	30	43	19	15	6192	19	27	35	13	16	4973	11
			2	37	52	26	16	7378	21	33	41	17	17	5901	12
		70	1	29	64	38	16	9105	49	26	55	29	17	7861	42
			2	35	76	52	17	10858	58	31	65	39	18	9350	49
DKV-9/D	24	50	1	27	32	9	12	4613	8	23	23	5	13	3282	0
			2	33	39	12	12	5640	9	28	28	7	14	4079	0
		70	1	27	51	20	12	7295	35	22	41	13	14	5905	27
			2	33	63	28	12	8963	43	28	50	19	14	7224	32
	28	50	1	35	53	21	12	7540	26	31	43	14	14	6150	18
			2	43	65	30	13	9268	31	38	53	21	14	7528	20
		70	1	34	77	41	12	10952	60	30	67	31	14	9554	52
			2	42	94	59	13	13500	74	37	82	46	15	11739	63

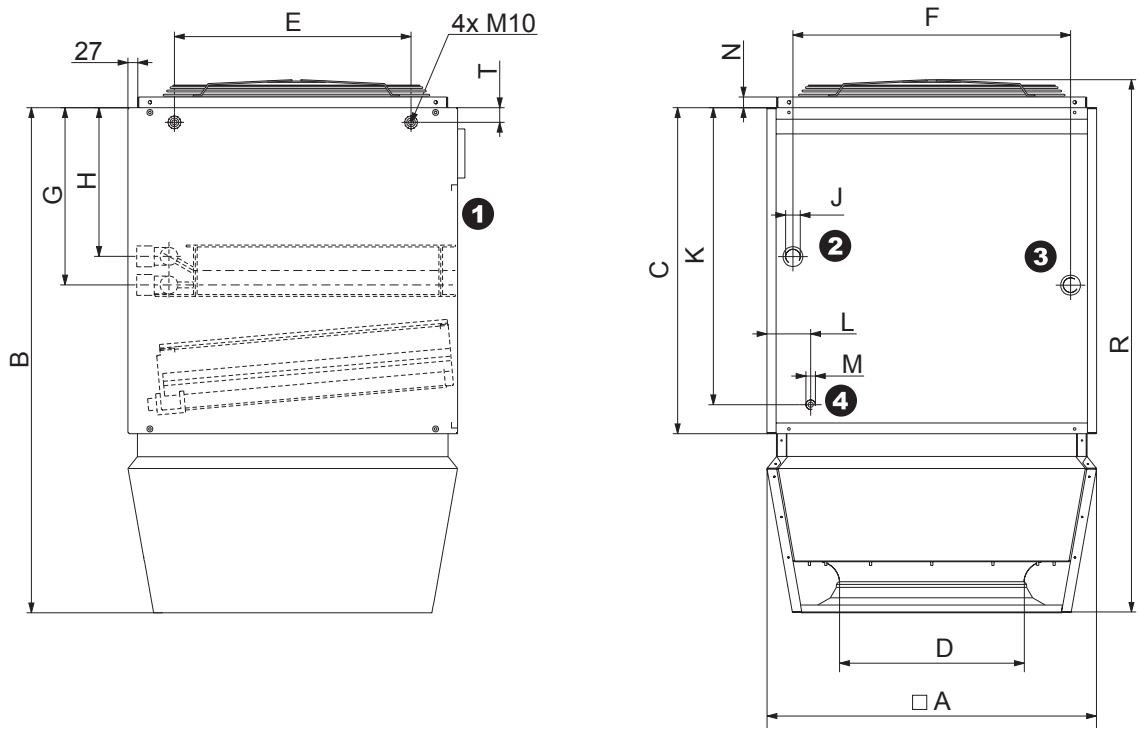
Legend:

- Type = Unit type
- t_{AI} = Air inlet temperature
- rh = Air inlet humidity
- St. = Fan speed
- Q_{sen} = Sensitive cooling capacity
- Q_{tot} = Total cooling capacity
- Δp_W = Water pressure drop
- t_S = Supply air temperature
- m_W = Water flow rate
- m_C = Amount of condensate

Table C5: Cooling capacities of the TopVent® DKV

Max. operating pressure	800	kPa
Maximum heating medium temperature	120	°C
Maximum supply air temperature	60	°C
Maximum ambient temperature	40	°C
Maximum amount of condensate DKV-6	60	kg/h
Maximum amount of condensate DKV-9	150	kg/h
Minimum air flow rate DKV-6	3100	m³/h
Minimum air flow rate DKV-9	5000	m³/h

Table C6: Application limits of the TopVent® DKV

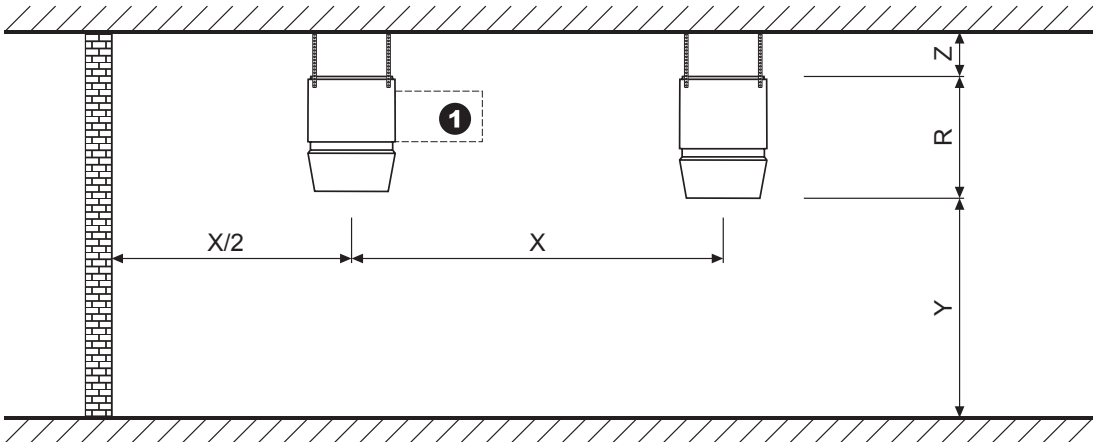


Unit type		DKV-6/C	DKV-9/C	DKV-9/D
A	mm	900	1100	1100
B	mm	1380	1500	1500
C	mm	890	930	930
Ø D	mm	500	630	630
E	mm	594	846	846
F	mm	758	882	882
G	mm	470	490	499
H	mm	392	412	404
J	"	1¼ (BSP female)	1½ (BSP female)	1½ (BSP female)
K	mm	836	877	877
L	mm	80	80	80
M	"	1 (BSP male)	1 (BSP male)	1 (BSP male)
N	mm	27	27	27
R	mm	1456	1584	1584
T	mm	40	40	40
Weight	kg	170	220	240
Water content of the coil	l	6.2	9.4	14.2

❶	Access panels
❷	Return
❸	Flow
❹	Condensate drain connection

Table C7: Dimensions and weights of the TopVent® DKV

TopVent® DKV
Technical data



Unit type			DKV-6/C		DKV-9/C		DKV-9/D	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Unit height R		m	1.456	1.456	1.584	1.584	1.584	1.584
Unit clearance X	min.	m	10	11	12	14	12	13
	max.	m	18	20	25	30	24	28
Mounting height Y [1)]	min.	m	4	4	5	5	5	5
Distance from ceiling Z	min.	m	0.3	0.3	0.4	0.4	0.4	0.4

1) The minimum height can be reduced by 1 m in each case using the 'air outlet box' option (see Section K 'Options').

❶ For service and maintenance provide a clear space of about 1.5 m on the side opposite the coil connections.

Table C8: Minimum and maximum distances

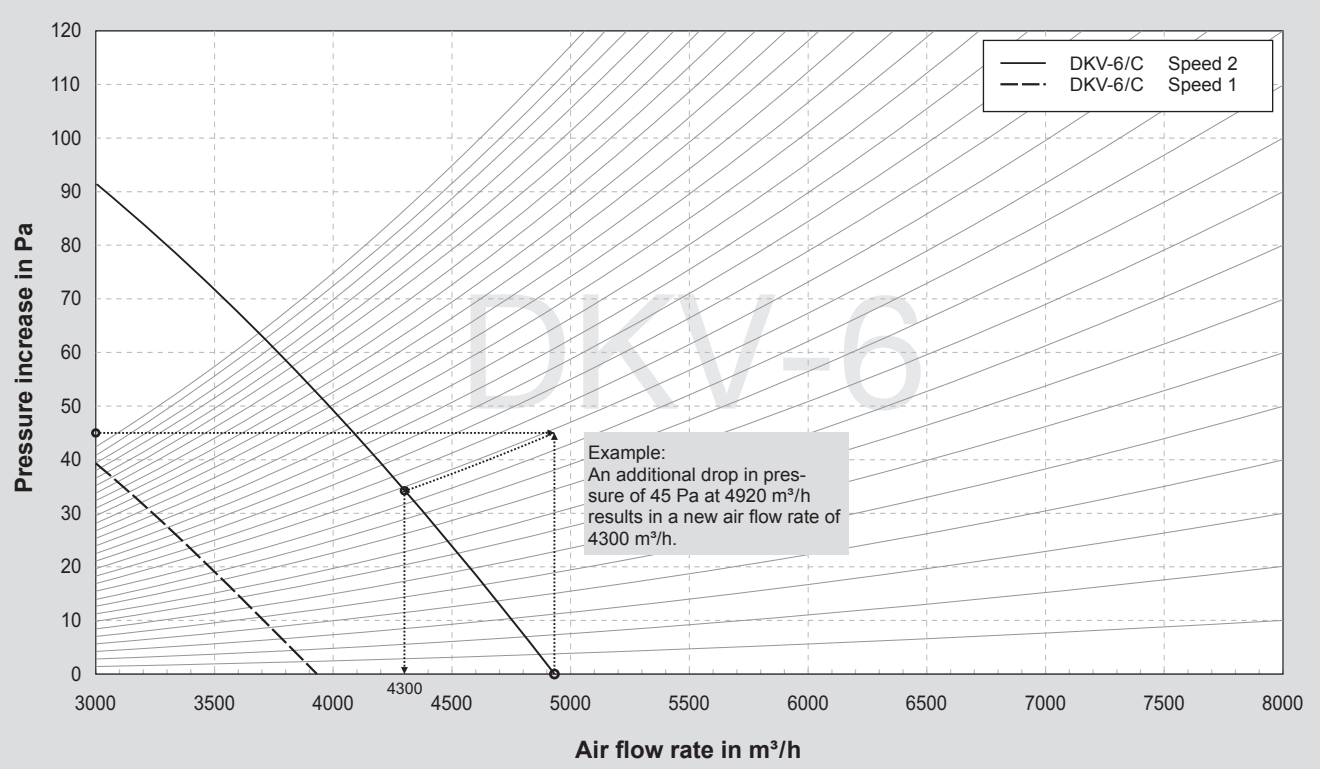


Diagram C1: Air flow rate for TopVent® DKV-6 with additional pressure drop

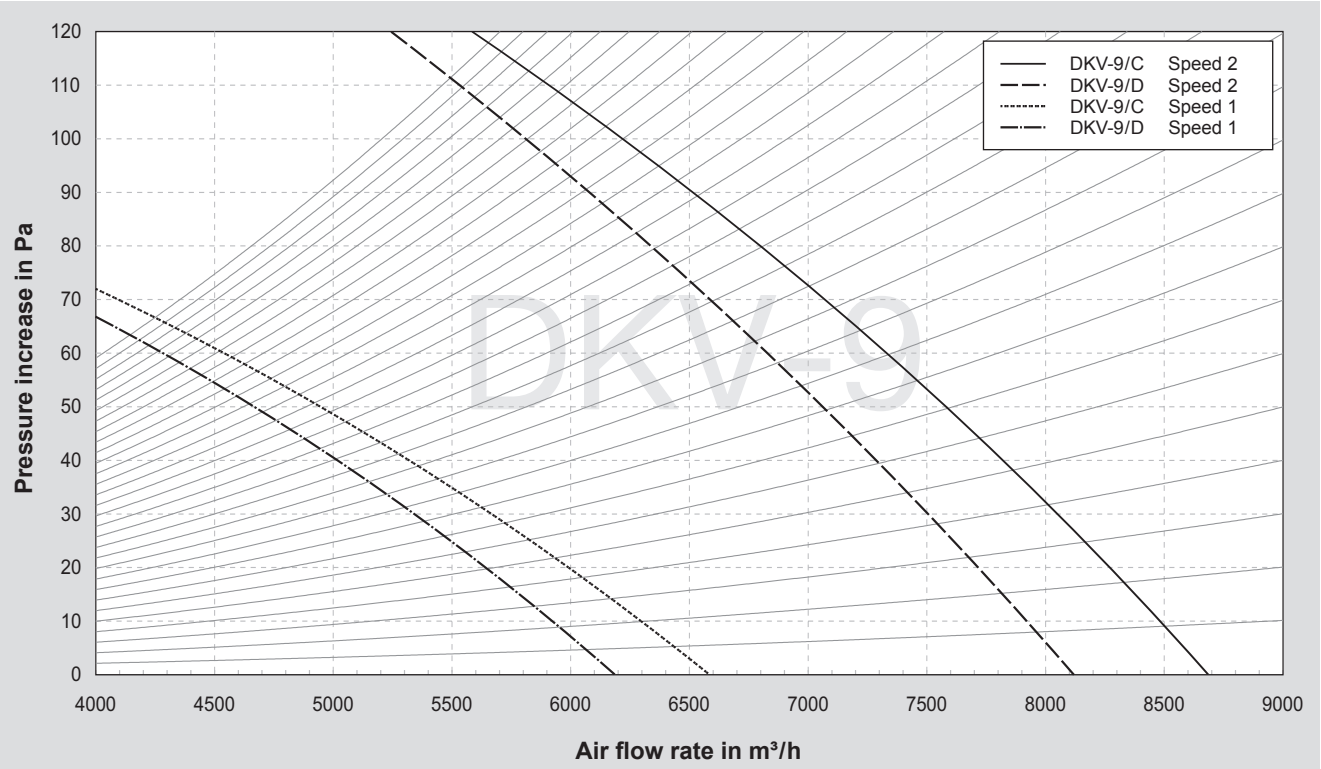


Diagram C2: Air flow rate for TopVent® DKV-9 with additional pressure drop

TopVent® DKV
Design example

4 Design example

The performance data for the most frequent design conditions are specified in Section 3 'Technical Data'. Use the selection program 'HK-Select' to calculate the performance data for other design data (room temperature, cooling medium temperature). You can download 'HK-Select' free of charge on the Internet.

The following design rating example relates to cooling mode. The design rating for heating mode can be performed analogously to the design rating example in Section B 'TopVent® DHV'.

Input data ● Geometry of the room (plan) ● Mounting height (= distance between the floor and lower edge of the TopVent® unit) ● Cooling load ● Desired room conditions ● Cooling medium temperature (flow/return) ● Comfort requirements (acoustic)	**Example** Geometry.....55 x 86 m Mounting height.....8 m Cooling load.....190 kW Room conditions.....24 °C / 50 % Cooling medium temperature ....8/14 °C Comfort requirements.....Standard
Comfort requirements Define the fan speed in accordance with acoustic requirements: Low noise level → fan speed 1 Normal noise level → fan speed 2	Standard → fan speed 2
Mounting height ● With the minimum mounting height (Table C8) check which units can be used. ● Strike units which are not adequate.	DKV-6/C ✓ DKV-9/C ✓ DKV-9/D ✓
Minimum number a) Minimum number based on the area In table C1 it is specified what maximum floor area can be covered by the TopVent® DKV. For a known floor area it is then possible to calculate – for each unit size – the minimum number of units required. b) Minimum number based on length x width Depending on the geometry of the hall and in relation to its length and width a certain number of units is required. This can be calculated from the maximum distances between the units and between them and the wall (see Table C8). c) Minimum number based on the cooling load Depending on the total cooling capacity required, a minimum number of units can be calculated for each unit size (see Table C5). The highest number from results a), b) and c) is the actual minimum number required.	Calculate the minimum number of units according to a), b) and c) and enter it in a table for each type of unit. Take the highest value as the minimum quantity. **Type** | **a)** | **b)** | **c)** DKV-6/C | 12 | 15 | 14 → 15 DKV-9/C | 6 | 6 | 8 → 8 DKV-9/D | 6 | 6 | 7 → 7

Definitive number of units Choose the final solution from the remaining possibilities, depending on the geometry of the hall and the costs.	7 units of DKV-9/D

TopVent® DKV
Options

5 Options

TopVent® DKV units can be adapted to the requirements of a particular project by means of a series of options. You will find a detailed description of all optional components in Section K 'Options' of this handbook.

Paint finish	at no extra cost in the standard Hoval colours red/orange or for an additional charge in any colour required
Suspension set	for mounting the unit on ceiling
Isolation switch	on/off switch that can be operated from the outside
Actuator for Air-Injector	for adjustment of the Air-Injector
Filter box	to filter recirculation air
Acoustic cowl	to reduce the noise level in the room (reduced noise emission from the Air-Injector)
Recirculation silencer	to reduce noise levels in the room (reduced noise reflection from the ceiling)
Air outlet box	for use of the TopVent® unit in low-ceiling halls
Insulation	to avoid condensation on the external surfaces of the Air-Injector
Condensate pump	for condensate drainage through waste water pipes directly below the ceiling or onto the roof

6 Control systems

For the TopVent® DKV there are components for control of the room temperature and of the air distribution that have been specially developed by Hoval and optimally matched to the devices. You will find a detailed description of these components in Section L 'Control Systems' of this handbook.

6.1 Room temperature control

TempTronic RC	This is a programmable, electronic temperature controller for fully automatic operation. Its control algorithm with fuzzy logic ensures extremely small control deviations and minimizes energy consumption.

6.2 Control of the air distribution

Automatic control by the TempTronic RC	The TempTronic RC also controls the air distribution in accordance with the changing operating conditions (i.e. depending on the speed level and on the temperature difference between the supply air and room air).
Manual control by means of a potentiometer	In applications in which the operating conditions only seldom change or when not such high comfort requirements are made, the air distribution can be manually controlled by a potentiometer.
Fixed setting	In cases where the air distribution always takes place under the same conditions (constant supply air temperature, constant air flow rate), it can have a fixed setting.

In indoor climate systems in which TopVent® DKV units are used together with RoofVent® fresh air handling units, Hoval DigiNet assumes all the control and regulation functions.

7 Transport and installation

Transport and assembly work to be carried out only by trained specialists!

A hoist is required for transport and installation of the components! Do not tilt the unit or lay it flat!

7.1 Installation

For ceiling installation the units are equipped as standard with 4 M10 rivet nuts with hexagon head bolts and washers. With these bolts and the height-adjustable suspension set (optional) the unit can be easily fastened to the ceiling.

The rivet nuts are only dimensioned for the unit's own weight. Do not fasten any additional loads!

The rivet nuts cannot take a bending moment; no eyebolts may be used!

Other fastenings with flat bars, perforated bars and angle section, but with steel cables as well, are also possible, however, the following instructions have to be heeded without fail:

- Lateral, inclined suspensions are allowed up to a maximum angle of 45°.
- The unit must be installed horizontally!

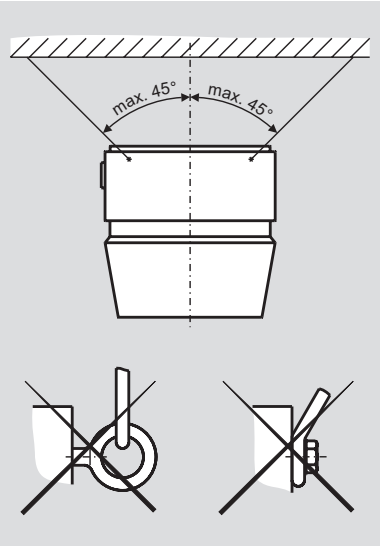


Table C3: Suspension of the TopVent® DKV

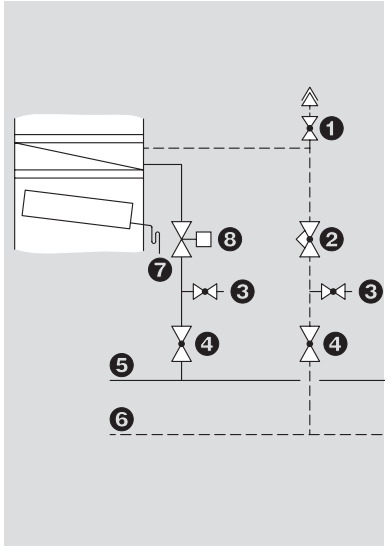
7.2 Hydraulic installation

Have the hydraulic installation performed by skilled personnel only!

- Combine units that run under the same operating conditions (room temperature, heat gains, operating time etc.) to form a control group.
- Warm or hot water up to a maximum of 120 °C can be used as the heating medium. For energy saving purposes a pre-regulation of the distributor is possible; however, it has to be ensured that the heat requirement of the individual heating coils can be met in any case.
- Connect the heating coils in accordance with Fig. C4. Depending on local conditions, check whether compensators for linear expansion are required for the flow and return lines and/or articulated connections are required for the units.

The coil cannot bear any loads, e.g. by means of the flow or return lines!

- Dimension the slopes and cross-section of the condensate drainage line so that no condensate backflow takes place.
- Hydraulically balance the individual units with one another so that uniform pressure admission is ensured.



❶	Vent with shut-off device
❷	Flow control valve
❸	Drain cocks
❹	Shut-off valves
❺	Flow
❻	Return
❼	Condensate drain (with odour trap)
❽	Control valve

Fig. C4: Connection of the heating/cooling coil

7.3 Electrical installation

The electrical connection must be performed up to the unit by a certified skilled electrician. The applicable regulations have to be observed (e.g. EN 60204-1).

The unit is supplied ready to operate.

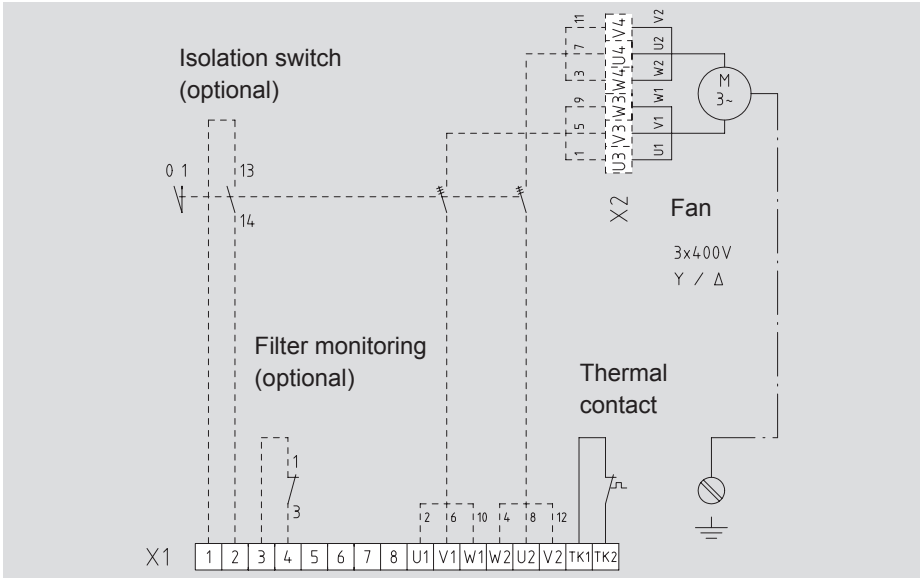
- Check whether the local operating voltage, frequency and fuse protection match the data on the type plate. If there are any discrepancies, the unit must not be connected!
- For long leads the cable cross-sections must be selected according to the technical regulations, e. g. VDE 0100.
- Perform the electrical installation work in accordance with the wiring diagram of the control system.
- Connect the TopVent® DKV units in accordance with the terminal diagram.

Connect the thermal contacts that are built into the motor. Only then is the motor protected against overheating.

- Do not forget the main switch for the complete system (control system and units).
- Several TopVent® units can be connected by means of a parallel circuit.

Wire the thermal contacts and isolation switch indicator in series!

- The condensate separator only functions while the fan is running. So switch off the coolant pump together with the fans.



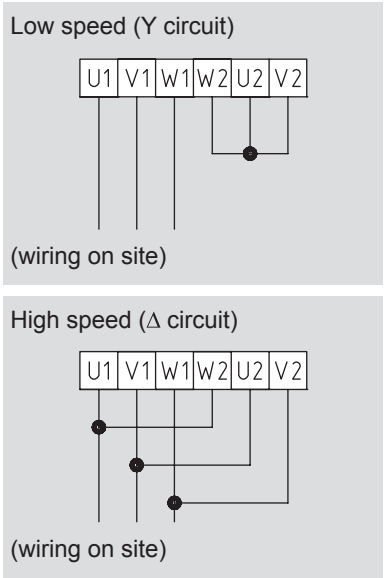


Fig. C5: Terminal diagram for TopVent® DKV

TopVent® DKV
Specification texts

8 Specification texts

8.1 TopVent® DKV
Recirculation unit for heating and cooling high spaces

Housing made of non-corrosive Aluzinc sheet metal, heating/cooling section insulated on the inside, equipped as standard with 4 rivet nuts size M10 with hexagon head bolts and washers for ceiling installation.
Heat exchanger made of copper tubes and aluminium fins, manifolds and distributor made of steel, integrated condensate separator with condensate connection.
Fan unit consisting of a 2-speed, 3-phase external rotor motor with pressure-resistant aluminium sickle-shaped blades, maintenance-free and quiet, with a high degree of efficiency. Motor protection through built-in thermal contacts. Protection class IP54.
Terminal box integrated into the side of the housing to connect supply voltage and accessories.
Vortex air distributor with a concentric outlet nozzle, 12 adjustable guide vanes, sound attenuation cowl and supply air temperature sensor.

Technical data

Fan speed	1	2	
Nominal air flow rate	_____	_____	m³/h
Floor area reached	_____	_____	m²
Mounting height	_____	_____	m
Nominal heating output	_____	_____	kW
with LPHW	_____	_____	°C
and air inlet temperature	_____	_____	°C
Nominal cooling capacity	_____	_____	kW
with LPCW	_____	_____	°C
air inlet temperature	_____	_____	°C
and air inlet humidity	_____	_____	%
Power consumption	_____	_____	kW
Current consumption	_____	_____	A
Voltage	400 V / 50 Hz		

DKV-6/C
DKV-9/C
DKV-9/D

8.2 Options

■ Standard paint finish SL
in the Hoval colours red (RAL 3000) and orange (RAL 2008)

■ Paint finish as desired
in RAL colour No. _____

■ Suspension set AHS
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.

■ Isolation switch RS
in the terminal box of the TopVent® unit

■ Actuator for Air-Injector VT-AS
with cable and plug for adjustment of the Air-Injector

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

■ Flat filter box FFK
with 4 pleated cell filters (according to DIN EN 779), with a pressure difference control device for filter monitoring

■ Acoustic cowl AHD
consisting of a sound attenuation cowl of large volume and a screen with a lining of sound attenuation material, insertion attenuation 4 dB(A)

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

■ Air outlet box AK
made of Aluzinc sheet metal, with 4 adjustable outlet grilles (replaces the Air-Injector)

■ Insulation ID
of the Air-Injector

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

8.3 Control systems

■ Room temperature control and automatic control of the air distribution by the TempTronic RC
Programmable regulation system with menu-guided operator control for fully-automatic operation of the TopVent® units:

- TempTronic RC, operator control terminal as a wall unit in a plastic housing with an integrated room temperature sensor
- RC station RCS for the power supply and control of several TopVent® units in parallel operation
- RC single station RCE for the power supply and control of a single TopVent® unit
- Actuator VT-AS for automatic adjustment of the air blow-out direction from vertical to horizontal
- Optional module OM for the control of additional functions, as a wall unit in a plastic housing
- Room temperature sensor RF for connection in place of the room temperature sensor that is integrated into the TempTronic RC, in a plastic housing for wall-mounted installation
- Room temperature mean value MRT4, 4 room temperature sensors for installation in the occupied area

■ Manual control of the air distribution by means of the potentiometer
Manual control by means of potentiometer and actuator for adjustment of the air blow-out direction from vertical to horizontal:

- Potentiometer wall unit PMS-W
- Potentiometer for installation into a control panel PMS-S
- Actuator VT-AS
- Transformer TA for a maximum of 7 actuators

TopVent® NHV

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

D

TopVent® NHV
Use

1 Use

1.1 Intended use
The TopVent® NHV unit is used to heat high spaces in recirculation mode.
Proper use also includes observance of the installation, commissioning, operating, and maintenance conditions (operating instructions) specified by the manufacturer as well as the consideration of foreseeable abnormal behaviour and residual dangers.

1.2 User group
TopVent® NHV units may only be installed, operated and maintained by authorized and trained skilled personnel. The operating instructions are for English-speaking operating engineers and technicians as well as specialists in building, heating and air technology.

1.3 Operating Modes
TopVent® NHV units have the following operating modes:
- Recirculation mode at low fan speed
- Recirculation mode at high fan speed
- Standby
- Off

The application limits specified in the Section 'Technical Data' must be complied with.
Any other use or any additional use counts as being improper. The manufacturer shall not be responsible for any damages that may result thereby.

The standard version of the units is not suitable for operation in explosion-prone areas, in wet rooms or in rooms with a high dust incidence.

1.4 Residual dangers
Despite all of the precautionary measures taken, there are residual dangers; these are potential, non-apparent dangers, such as:
- Danger when working on the electrical system.
- When working on the TopVent® unit, parts (e.g. tools) can be dropped.
- Malfunctions due to defective parts
- Danger from hot water when working on the hot water supply.

2 Construction and operation

The TopVent® NHV unit is used for low-cost recirculation heating in high halls. It is installed under the ceiling. It takes in room air, heats it in the heating coil and blows it back into the room through the outlet nozzle. The air distribution cannot be regulated with the TopVent® NHV. The unit is therefore especially suitable for applications in which the comfort requirement is comparably minor (e.g. high-bay warehouses).
Thanks to its high performance the TopVent® NHV covers a large area. Therefore, compared to other systems, fewer units are needed to achieve the required conditions.
3 unit sizes, 2-speed fans, various coil types and a series of accessories make it possible to provide a customized solution for any hall. Special coils (hot water, steam, electric heating coils) are also available.
The TopVent® NHV consists of the heating section (with fan and heating coil) and the outlet nozzle. Both components are bolted together, but can be dismantled separately again.

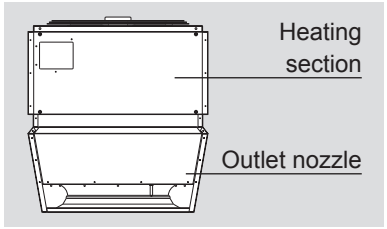


Fig. D1: Components of the TopVent® NHV

❶	Housing: made of corrosion-resistant Aluzinc sheet metal
❷	Terminal box
❸	Fan: maintenance-free, low-noise sickle fan with a low energy consumption
❹	Heat exchanger: LPHW heating coil consisting of copper tubes with aluminium fins
❺	Outlet nozzle

Fig. D2: Construction of the TopVent® NHV

TopVent® NHV
Technical data

3 Technical data

Unit type		NHV-6/A		NHV-6/B		NHV-6/C	
Fan speed		**1**	**2**	**1**	**2**	**1**	**2**
Rotational speed (nominal)	min^{-1}	690	900	690	900	690	900
Nominal air flow rate	m^3/h	4600	6300	4400	6100	3900	5500
Max. floor area reached [1)]	m^2	385	573	366	549	319	480
Power consumption (at 400 V / 50 Hz)	kW	0.48	0.69	0.48	0.69	0.48	0.69
Current consumption (at 400 V / 50 Hz)	A	0.78	1.25	0.78	1.25	0.78	1.25
Unit type		**NHV-9/A**		**NHV-9/B**		**NHV-9/C**	
Fan speed		**1**	**2**	**1**	**2**	**1**	**2**
Rotational speed (nominal)	min^{-1}	680	900	680	900	680	900
Nominal air flow rate	m^3/h	7100	9400	7100	9400	6500	8600
Max. floor area reached [1)]	m^2	674	1009	674	1009	597	885
Power consumption (at 400 V / 50 Hz)	kW	0.70	0.98	0.70	0.98	0.70	0.98
Current consumption (at 400 V / 50 Hz)	A	1.15	1.75	1.15	1.75	1.15	1.75
Unit type		**NHV-10/A**		**NHV-10/B**		**NHV-10/C**	
Fan speed		**1**	**2**	**1**	**2**	**1**	**2**
Rotational speed (nominal)	min^{-1}	660	860	660	860	660	860
Nominal air flow rate	m^3/h	8100	10500	8100	10500	7500	9700
Max. floor area reached [1)]	m^2	811	1194	811	1194	727	1058
Power consumption (at 400 V / 50 Hz)	kW	0.99	1.53	0.99	1.53	0.99	1.53
Current consumption (at 400 V / 50 Hz)	A	1.77	3.35	1.77	3.35	1.77	3.35

[1)] Mounting height H_{max} = 11 m with a temperature difference between supply air and room air of up to 30 K

Table D1: Technical data of the TopVent® NHV

Type designation code

NHV – 6 / A

Unit type
TopVent® NHV

Unit size
6, 9 or 10

Heat exchanger
Coil type A, B or C

Table D2: Type designation code

Unit type			NHV-6		NHV-9		NHV-10	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Sound pressure level (5 m distance) [1)]		dB(A)	47	53	52	58	61	68
Total sound power level		dB(A)	69	75	74	80	83	90
Octave sound power level	63 Hz	dB	75	79	79	83	94	99
	125 Hz	dB	73	79	74	83	87	94
	250 Hz	dB	68	76	74	79	87	94
	500 Hz	dB	64	70	68	74	80	87
	1000 Hz	dB	64	71	70	75	77	84
	2000 Hz	dB	61	68	68	75	71	78
	4000 Hz	dB	54	62	62	68	64	72
	8000 Hz	dB	47	55	55	62	55	63

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

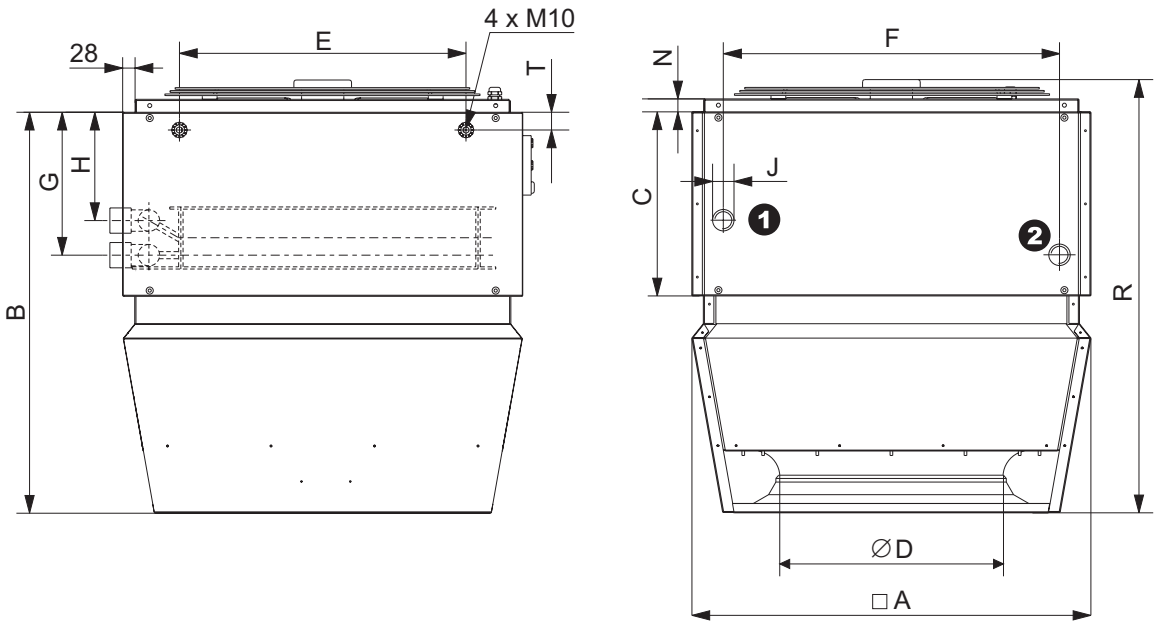
Table D3: Sound power values of the TopVent® NHV

Air inlet temperature				15 °C					20 °C				
Size	LPHW °C	Type	St.	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h
NHV-6	80/60	A	1	30	10.4	5	34	1277	27	11.0	4	37	1153
			2	35	14.8	7	31	1522	32	15.7	6	35	1375
		B	1	41	8.5	9	42	1746	37	9.0	8	44	1576
			2	50	12.1	13	38	2131	45	12.8	11	41	1924
		C	1	56	6.4	7	56	2399	51	6.7	6	57	2167
			2	72	8.9	11	53	3101	65	9.4	9	54	2800
	60/40	A	1	17	13.3	2	26	746	14	14.6	2	29	620
			2	21	19.1	3	24	888	17	21.0	2	28	737
		B	1	24	10.9	4	30	1018	20	11.9	3	33	843
			2	29	15.6	5	29	1237	24	17.2	4	31	1024
		C	1	33	8.0	3	39	1427	28	8.7	2	40	1192
			2	43	11.3	4	37	1835	36	12.4	3	39	1526
NHV-9	80/60	A	1	51	10.8	5	36	2181	46	11.4	4	39	1969
			2	60	14.8	7	33	2560	54	15.7	6	36	2311
		B	1	64	9.8	8	41	2760	58	10.3	6	43	2490
			2	76	13.2	10	38	3272	69	14.0	9	41	2952
		C	1	91	7.4	7	55	3921	83	7.8	6	56	3542
			2	113	9.8	10	53	4824	102	10.4	8	54	4356
	60/40	A	1	30	13.9	2	27	1269	25	15.3	1	30	1053
			2	35	19.2	3	26	1487	29	21.1	2	29	1232
		B	1	37	12.5	3	30	1602	31	13.7	2	32	1326
			2	44	17.1	4	28	1893	36	18.9	3	31	1566
		C	1	54	9.3	3	39	2328	45	10.2	2	40	1943
			2	66	12.5	4	37	2852	55	13.7	3	38	2371
NHV-10	80/60	A	1	55	12.5	6	34	2354	50	13.3	5	38	2125
			2	63	16.8	8	32	2721	57	17.8	6	36	2456
		B	1	70	11.2	9	40	2993	63	11.9	7	42	2700
			2	81	15.0	12	37	3490	73	15.9	10	40	3149
		C	1	102	8.6	8	54	4365	92	9.0	7	55	3942
			2	123	11.1	11	51	5256	111	11.7	9	53	4745
	60/40	A	1	32	16.1	2	26	1369	26	17.8	2	29	1135
			2	37	21.8	3	25	1579	31	24.1	2	28	1309
		B	1	40	14.5	4	29	1735	33	15.9	3	32	1435
			2	47	19.4	5	28	2017	39	21.4	3	31	1668
		C	1	60	10.8	3	38	2586	50	11.9	2	39	2154
			2	72	14.2	5	36	3102	60	15.6	3	38	2575

Legend:
Type = Type of heating coil
St. = Fan speed
Q = Heating output
H_{max} = Max. mounting height
Δp_W = Water pressure drop
t_S = Supply air temperature
m_W = Water flow rate

Table D4: Heating outputs of the TopVent® NHV

TopVent® NHV
Technical data



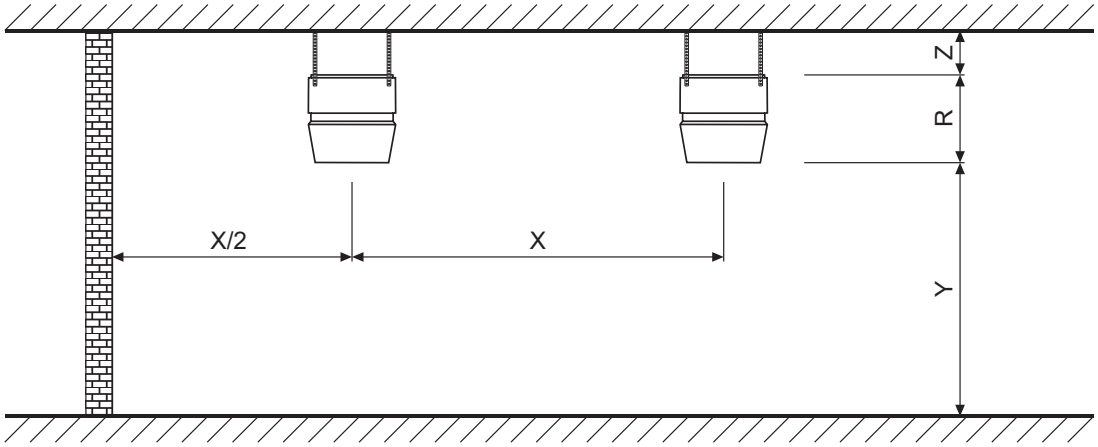
Unit type		NHV-6			NHV-9			NHV-10		
A	mm	900			1100			1100		
B	mm	905			1050			1170		
C	mm	415			480			601		
Ø D	mm	500			630			630		
E	mm	594			846			846		
F	mm	758			882			882		
G	mm	322			367			488		
H	mm	244			289			410		
J	"	1¼ (BSP female)			1½ (BSP female)			1½ (BSP female)		
N	mm	30			30			27		
R	mm	977			1120			1252		
T	mm	40			40			40		
Weight	kg	97			148			182		
Water content of the coil	Type	A	B	C	A	B	C	A	B	C
	l	3.1	3.1	6.2	4.7	4.7	9.4	4.7	4.7	9.4

❶ Return
❷ Flow

Table D5: Dimensions and weights of the TopVent® NHV

Max. operating pressure	800	kPa
Maximum heating medium temperature	120	°C
Maximum supply air temperature	60	°C
Maximum ambient temperature	40	°C

Table D6: Application limits of the TopVent® NHV



Unit type				**NHV-6/A**		**NHV-6/B**		**NHV-6/C**	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Unit height R		m	0.977	0.977	0.977	0.977	0.977	0.977
Unit clearance X	min.	m	10	12	10	11	10	11
	max.	m	19	23	19	23	18	21
Mounting height Y	min.	m	6	6	6	6	6	6
Distance from ceiling Z	min.	m	0.3	0.3	0.3	0.3	0.3	0.3
Unit type				**NHV-9/A**		**NHV-9/B**		**NHV-9/C**
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Unit height R		m	1.12	1.12	1.12	1.12	1.12	1.12
Unit clearance X	min.	m	12	14	12	14	12	13
	max.	m	25	30	25	30	23	28
Mounting height Y	min.	m	7	7	7	7	7	7
Distance from ceiling Z	min.	m	0.4	0.4	0.4	0.4	0.4	0.4
Unit type				**NHV-10/A**		**NHV-10/B**		**NHV-10/C**
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Unit height R		m	1.252	1.252	1.252	1.252	1.252	1.252
Unit clearance X	min.	m	13	15	13	15	12	14
	max.	m	27	33	27	33	25	31
Mounting height Y	min.	m	8	8	8	8	8	8
Distance from ceiling Z	min.	m	0.4	0.4	0.4	0.4	0.4	0.4

Table D7: Minimum and maximum distances

TopVent® NHV
Technical data

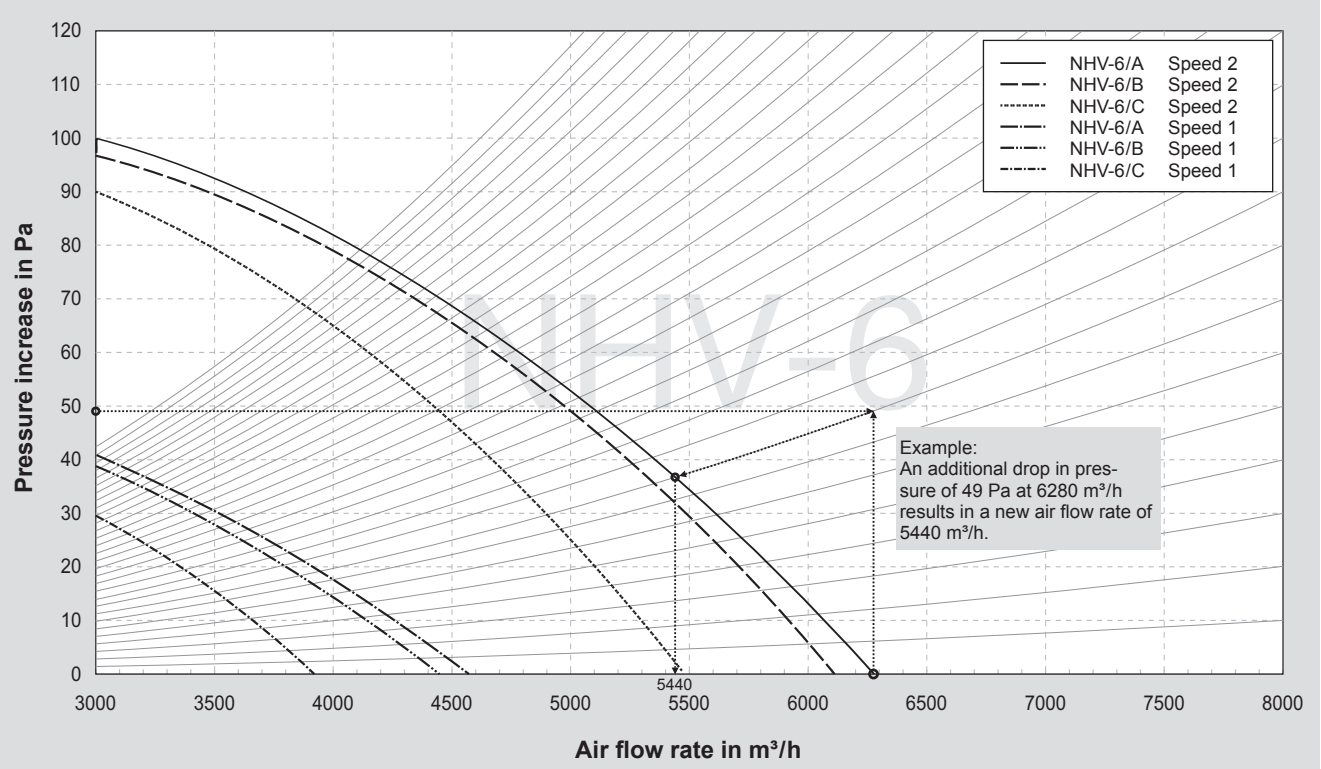


Diagram D1: Air flow rate for TopVent® NHV-6 with additional pressure drop

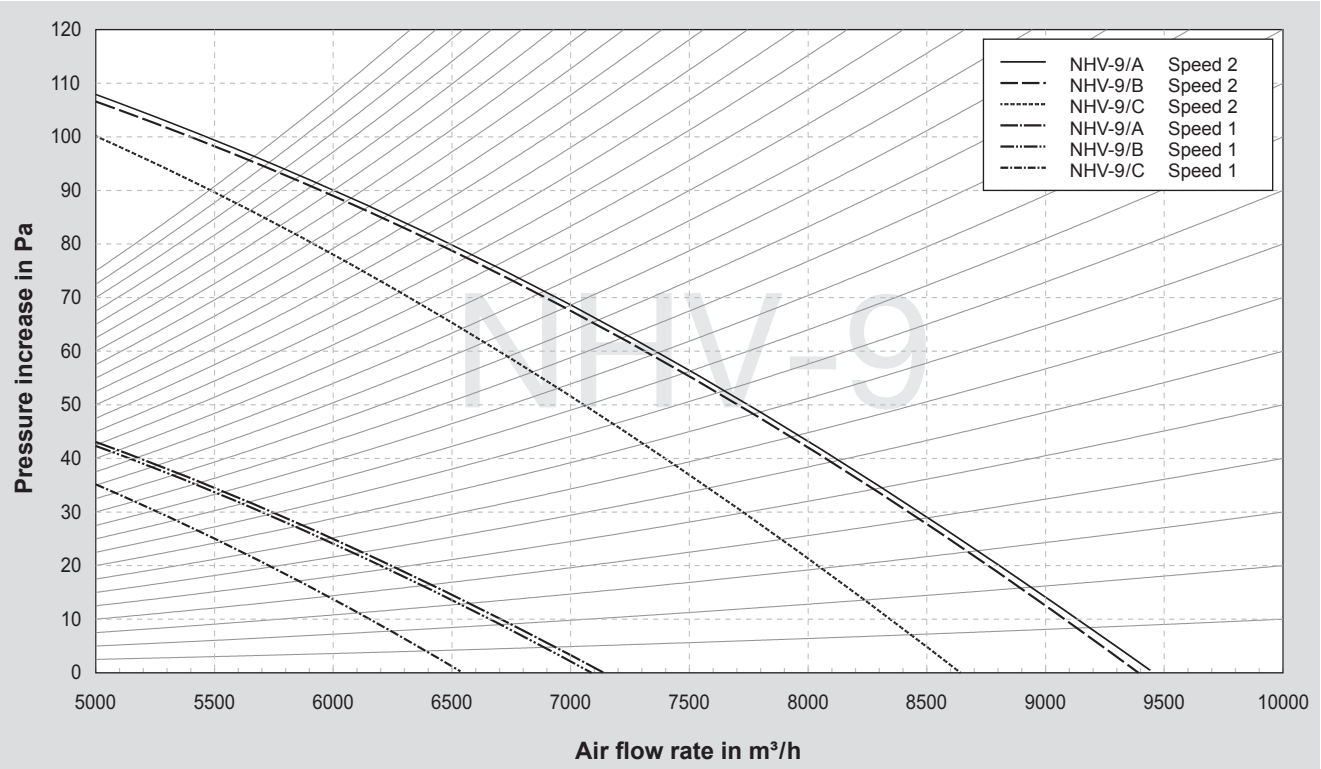


Diagram D2: Air flow rate for TopVent® NHV-9 with additional pressure drop

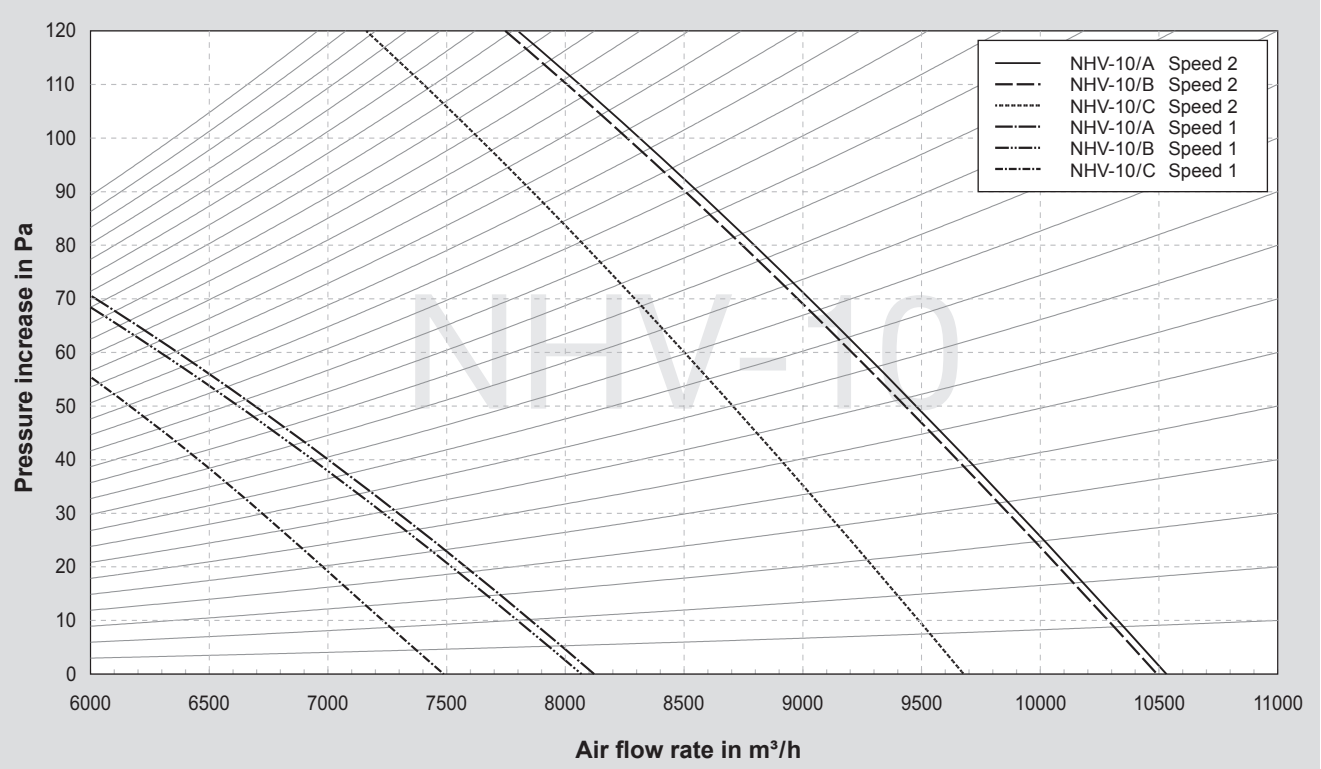


Diagram D3: Air flow rate for TopVent® NHV-10 with additional pressure drop

TopVent® NHV
Design example

4 Design example

The performance data for the most frequent design rating conditions are specified in Section 3 'Technical Data'. Use the selection program 'HK-Select' to calculate the performance data for other design data (room temperature, heating medium temperature). You can download 'HK-Select' free of charge on the Internet.

Input data
- Geometry of the room (plan)
- Mounting height (= distance between the floor and lower edge of the TopVent® unit)
- Heating load
- Desired room temperature
- Heating medium temperature (flow/return)
- Comfort requirements (acoustic)

Example
Geometry.....38 x 62 m
Mounting height.....12 m
Heating load .....290 kW
Room temperature.....15 °C
Heating medium temperature....80/60 °C
Comfort requirements.....Standard

Comfort requirements
Define the fan speed in accordance with acoustic requirements:
Low noise level → fan speed 1
Normal noise level → fan speed 2

Standard → fan speed 2

Mounting height
- With the minimum mounting height (Table D7) check which units can be used.
- With the maximum mounting height (Table D4) check which units can be used.
- Strike units which are not adequate.

NHV-6/A	NHV-9/A	NHV-10/A
NHV-6/B	NHV-9/B	NHV-10/B
~~NHV-6/C~~	~~NHV-9/C~~	~~NHV-10/C~~

Minimum number
a) Minimum number based on the area
In table D1 it is specified what maximum floor area can be covered by the TopVent® NHV. For a known floor area it is then possible to calculate – for each unit size – the minimum number of units required.
b) Minimum number based on length x width
Depending on the geometry of the hall and in relation to its length and width a certain number of units is required. This can be calculated from the figures for the maximum distances between the units and between them and the wall (see Table D7).
c) Minimum number based on the heating load
Depending on the total heat output required, a minimum number of units can be calculated for each unit size (see Table D4).
The highest number from results a), b) and c) is the actual minimum number required.

Calculate the minimum number of units according to a), b) and c) and enter it in a table for each type of unit. Take the highest value as the minimum quantity.

Type	a)	b)	c)	
NHV-6/A	5	6	9	9
NHV-6/B	5	6	6	6
NHV-6/C	None			–
NHV-9/A	3	4	5	5
NHV-9/B	3	4	4	4
NHV-9/C	None			–
NHV-10/A	2	4	5	5
NHV-10/B	2	4	4	4
NHV-10/C	None			–

TopVent® NHV
Design example

Definitive number of units Choose the final solution from the remaining possibilities, depending on the geometry of the hall and the costs.	4 units of NHV-9/B

TopVent® NHV
Options

5 Options

TopVent® NHV units can be adapted to the requirements of a particular project by means of a series of options. You will find a detailed description of all optional components in Section K 'Options' of this handbook.

Paint finish	at no extra cost in the standard Hoval colours red/orange or for an additional charge in any colour required
Suspension set	for mounting the unit on ceiling
Isolation switch	on/off switch that can be operated from the outside
Filter box	to filter recirculation air
Recirculation silencer	to reduce noise levels in the room (reduced noise reflection from the ceiling)
Explosion-proof design	for use of the TopVent® NHV in explosion-prone areas (zone 1 and zone 2), for NHV-6 and NHV-9 only

6 Control systems

For the TopVent® NHV there are components for control of the room temperature that have been specially developed by Hoval and optimally matched to the units. You will find a detailed description of these components in Section L 'Control Systems' of this handbook.

Room temperature control

TempTronic RC	This is a programmable, electronic temperature controller for fully automatic operation. Its control algorithm with fuzzy logic ensures extremely small control deviations and minimizes energy consumption.
EasyTronic	This is a simple temperature controller without a time switch. The room’s setpoint temperature is adjusted manually and the desired fan speed is selected by means of a switch.

7 Transport and installation

Transport and assembly work to be carried out only by trained specialists!

A hoist is required for transport and installation of the components! Do not tilt the unit or lay it flat!

7.1 Installation

For ceiling installation the units are equipped as standard with 4 M10 rivet nuts with hexagon head bolts and washers. With these bolts and the height-adjustable suspension set (optional) the unit can be easily fastened to the ceiling.

The rivet nuts are only dimensioned for the unit's own weight. Do not fasten any additional loads!

The rivet nuts cannot take a bending moment; no eyebolts may be used!

Other fastenings with flat bars, perforated bars and angle section, but with steel cables as well, are also possible, however, the following instructions have to be heeded without fail:

- Lateral, inclined suspensions are allowed up to a maximum angle of 45°.
- The unit must be installed horizontally!

7.2 Hydraulic Installation

Have the hydraulic installation performed by skilled personnel only!

- Combine units that run under the same operating conditions (room temperature, heat gains, operating time etc.) to form a control group.
- Warm or hot water up to a maximum of 120 °C can be used as the heating medium. For energy saving purposes a pre-regulation of the distributor is possible; however, it has to be ensured that the heat requirement of the individual heating coils can be met in any case.
- Connect the heating coils in accordance with Fig. D4. Depending on local circumstances it has to be checked whether compensators for the feed and return lines for compensation of the linear expansion and/or articulated connections are required for the units.

The coil cannot bear any loads, e.g. by means of the flow or return lines!

- Hydraulically balance the individual units with one another so that uniform pressure admission is ensured.

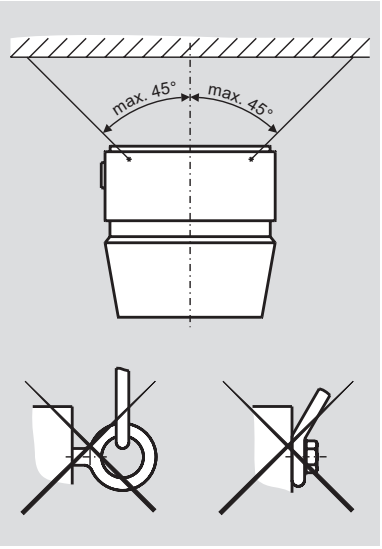
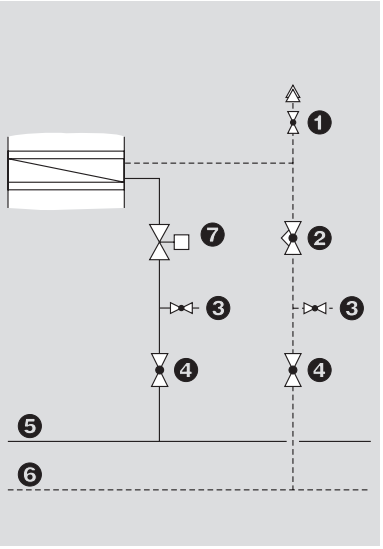


Table D3: Suspension of the TopVent® NHV



1	Vent with shut-off device
2	Flow control valve
3	Drain cocks
4	Shut-off valves
5	Flow
6	Return
7	Control valve

Fig. D4: Connection of the heating coil

7.3 Electrical installation

The electrical connection must be performed up to the unit by a certified skilled electrician. The applicable regulations have to be observed (e.g. EN 60204-1).

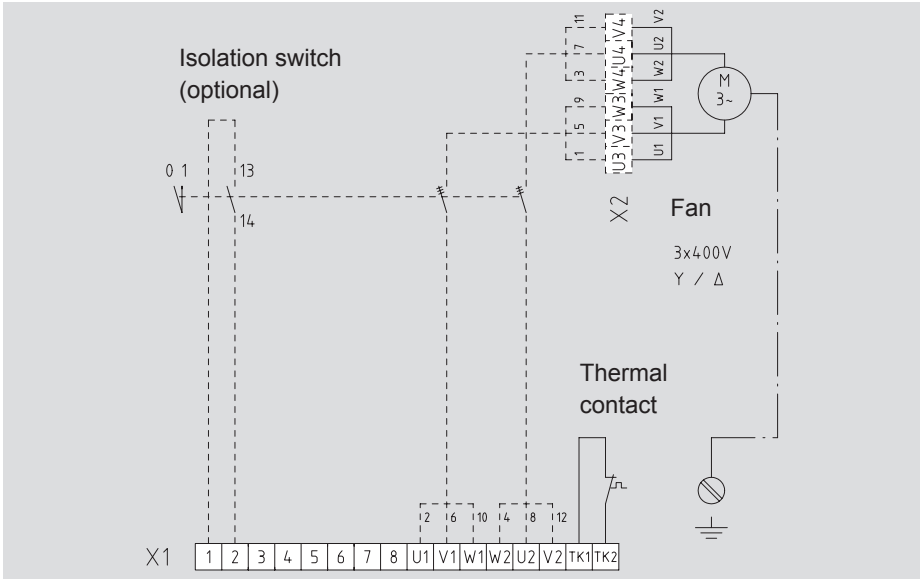
The unit is supplied ready to operate.

- Check whether the local operating voltage, frequency and fuse protection match the data on the type plate. If there are any discrepancies, the unit must not be connected!
- For long leads the cable cross-sections must be selected according to the technical regulations, e. g. VDE 0100.
- Perform the electrical installation work in accordance with wiring diagram of the control system.
- Connect the TopVent® NHV units in accordance with the terminal diagram.

Connect the thermal contacts that are built into the motor. Only then is the motor protected against overheating.

- Do not forget the main switch for the complete system (control system and units).
- Several TopVent® units can be connected by means of a parallel circuit.

Wire the thermal contacts and isolation switch indicator in series!



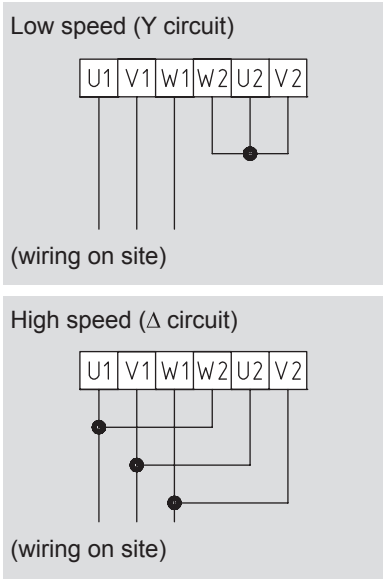


Fig. D5: Terminal diagram for TopVent® NHV

TopVent® NHV
Specification texts

8 Specification texts

8.1 TopVent® NHV
Recirculation unit for heating high spaces with lower comfort requirement

Housing made of non-corrosive Aluzinc sheet metal, standard equipment with 4 riveting nuts M10 with hexagon bolts and washers for ceiling installation.
Heat exchanger made of copper tubes and aluminium fins, manifolds and distributor made of steel.
Fan unit consisting of a 2-speed, 3-phase external rotor motor with pressure-resistant aluminium sickle-shaped blades, maintenance-free and quiet, with a high degree of efficiency. Motor protection through built-in thermal contacts. Protection class IP54.
Terminal box integrated into the side of the housing for connection of the supply voltage and the accessories.
Concentric outlet nozzle with a supply air sensor.

Technical data

Fan speed	1	2	
Nominal air flow rate	_____	_____	m³/h
Floor area reached	_____	_____	m²
Mounting height	_____	_____	m
Nominal heating output	_____	_____	kW
with LPHW	_____	_____	°C
and air inlet temperature	_____	_____	°C
Power consumption	_____	_____	kW
Current consumption	_____	_____	A
Voltage	400 V / 50 Hz		

NHV-6/A NHV-6/B NHV-6/C
NHV-9/A NHV-9/B NHV-9/C
NHV-10/A NHV-10/B NHV-10/C

8.2 Options

■ Standard paint finish SL
in the Hoval colours red (RAL 3000) and orange (RAL 2008)

■ Paint finish as desired
in RAL colour No. _____

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

■ Isolation switch RS
in the terminal box of the TopVent® unit

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

■ Flat filter box FFK
with 4 pleated cell filters (according to DIN EN 779), with a pressure difference control device for filter monitoring

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

8.3 Control systems

■ Room temperature control by the TempTronic RC
Programmable regulation system with menu-guided operator control for fully-automatic operation of the TopVent® units:
- TempTronic RC, operator control terminal, as a wall unit in a plastic housing with an integrated room temperature sensor
- RC station RCS for the power supply and control of several TopVent® units in parallel operation
- RC single station RCE for the power supply and control of a single TopVent® unit
- Optional module OM for the control of additional functions, as a wall unit in a plastic housing
- Room temperature sensor RF for the connection in place of the room temperature sensor that is integrated into the TempTronic RC, in a plastic housing for wall-mounted installation
- Room temperature mean value MRT4, 4 room temperature sensors for installation in the occupied area

■ Room temperature control by means of EasyTronic
Single switching device with 2-point regulation and manual changeover between fan speed 1 and 2
- EasyTronic ET, switching device for heating mode, as a wall unit in a plastic housing, including room thermostat

TopVent® commercial CAU

Roof unit for ventilating, heating and cooling supermarkets

E

TopVent® commercial CAU
Use

1 Use

1.1 Intended use
The TopVent® commercial CAU is used to ventilate, heat and cool large rooms in fresh air, mixed air and recirculation mode.
Proper use also includes observance of the mounting, commissioning, operating, and servicing conditions (operating instructions) specified by the manufacturer as well as the consideration of foreseeable abnormal behaviour and residual dangers.

1.2 User group
TopVent® commercial CAU units may only be installed, operated and maintained by authorized and trained skilled personnel. The operating instructions are for English-speaking operating engineers and technicians as well as specialists in building, heating and air technology.

1.3 Operating Modes
TopVent® commercial CAU units have the following operating modes:
- Fresh air, mixed air or recirculation mode at low fan speeds(0 ... 100 % fresh air)
- Fresh air, mixed air or recirculation mode at high fan speed (0 ... 100 % fresh air)
- Standby
- Off

The application limits specified in the Section 'Technical Data' must be complied with.
Any other or any additional use counts as improper. The manufacturer shall not be responsible for any damages that may result thereby.

The units are not suitable for operation in explosion-prone areas, in wet rooms or in rooms with a high dust incidence.

1.4 Residual dangers
Despite all of the precautionary measures taken, there are residual dangers; these are potential, non-apparent dangers, such as:
- Danger when working on the electrical system.
- When working on the TopVent® unit, parts (e.g. tools) can be dropped.
- Malfunctions due to defective parts
- Danger from hot water when working on the hot water supply.

2 Construction and operation

The TopVent® commercial CAU unit is for the purpose of ventilating, heating and cooling in fresh air, mixed air or recirculation mode; it was developed specially for use in hypermarkets and supermarkets. The unit is installed by means of its corresponding roof frame in the roof. Depending on the position of the dampers it draws in fresh air and/or indoor air, filters, heats or cools it and blows it into the room through the Air-Injector.
Thanks to its high performance and efficient air distribution the TopVent® commercial CAU covers a large area. Therefore, compared to other systems, fewer units are needed to achieve the required conditions.
Thanks to its installation in the roof the units do not protrude so far into the room and maintenance work can be performed from the roof without disturbing operations.

2.1 Unit construction
The TopVent® commercial CAU consists of the following components:
- Fresh air roof hood (with 2 weather grilles, inspection door, 2 filters class G4 and a differential pressure control device for filter monitoring)
- Mixed air box (with fresh air and recirculation air dampers linked to move in opposite directions and an actuator)
- Roof frame
- Heating/cooling section (with fan, heat exchanger and integrated condensate separator for the condensate incurred)
- Automatically adjustable vortex air distributor Air-Injector

The roof hood and the heating/cooling section are insulated to avoid condensation on the external surfaces. The components are bolted together, but can be dismantled separately again.

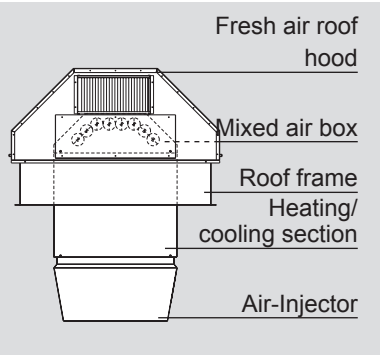
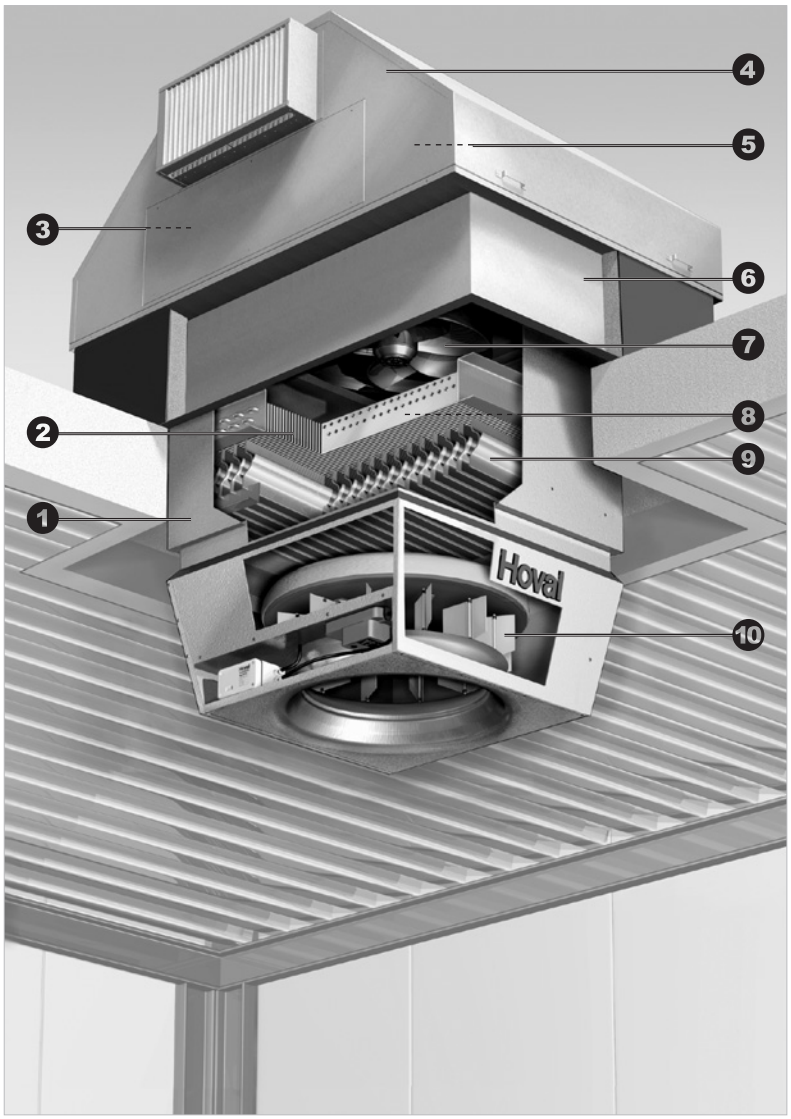


Fig. E1: Components of the TopVent® commercial CAU



❶	Housing: made of corrosion-resistant Aluzinc sheet metal; the heating/cooling section is insulated
❷	Heat exchanger: LPHW/LPCW coil consisting of copper tubes with aluminium fins
❸	Terminal box: with an isolation switch, easily accessible behind the inspection door.
❹	Roof hood insulated, easy to remove with 4 handles, with 2 weather grilles, 2 G4 filters and a pressure control device for filter monitoring
❺	Mixed air box: with fresh air and recirculation air dampers linked to move in opposite directions (dampers made of extruded aluminium profile section and plastic gearwheels) and an actuator
❻	Roof frame: made of sheet steel (insulation on site)
❼	Fan maintenance-free, low-noise sickle fan with a low energy consumption
❽	Frost protection thermostat: installed in the heat exchanger
❾	Condensate separator: with condensate connection
❿	Air-Injector: patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area

Fig. E2: Construction of the TopVent® commercial CAU

2.2 Air distribution by means of the Air-Injector

The patented air distributor – called the Air-Injector – is the core element. The discharge angle of the air is set using the adjustable vanes. It depends on the air flow rate (→ fan speed), the mounting height and the temperature difference between the supply air and room air. The air is therefore blown vertically downwards, conically or horizontally into the room. This ensures that

- with each TopVent® commercial CAU unit a large area of the hall is heated,
- the occupied area is draught-free,
- the temperature stratification in the room is reduced, thus saving energy.

TopVent® commercial CAU
Technical data

3 Technical data

Unit type		CAU-9/D	
Fan speed		**1**	**2**
Rotational speed (nominal)	min^{-1}	660	860
Nominal air flow rate	m³/h	5200	6800
Max. floor area reached [1)]	m²	447	635
Power consumption (at 400 V / 50 Hz)	kW	1.00	1.65
Current consumption (at 400 V / 50 Hz)	A	1.80	3.50

[1)] Mounting height H_{max} = 11 m with a temp. difference between supply air and room air of up to 30 K

Table E1: Technical data of the TopVent® commercial CAU

Unit type reference

CAU – 9 / D / DN5

Unit type
TopVent® commercial CAU

Unit size
Size 9

Heat exchanger
Coil type D

Electrical connection
DN5 = DigiNet 5
KK = Terminal box

Table E2: Type designation code

Unit type CAU-9			outside		in the room	
Fan speed			**1**	**2**	**1**	**2**
Sound pressure level (at a distance of 5 m) [1)]		dB(A)	48	55	57	62
Total sound power level		dB(A)	70	77	79	84
Octave sound power level	63 Hz	dB	82	86	90	93
	125 Hz	dB	70	81	85	88
	250 Hz	dB	74	82	85	88
	500 Hz	dB	66	75	76	81
	1000 Hz	dB	62	68	73	78
	2000 Hz	dB	55	62	67	72
	4000 Hz	dB	49	52	60	66
	8000 Hz	dB	36	39	51	57

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

Table E3: Sound power values of the TopVent® commercial CAU

Air inlet temperature [1]				15 °C					20 °C				
Size	LPHW °C	Type	St.	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h
CAU-9	80/60	D	1	– [2]	–	–	–	–	–	–	–	–	–
			2	–	–	–	–	–	–	–	–	–	–
	60/40	D	1	61	7.0	3	45	2628	54	7.6	2	45	2333
			2	77	9.0	4	43	3301	68	9.9	3	44	2928

[1] The air inlet temperatures (15 or 20 °C) are equal to the room air temperature. The quoted heating outputs relate to a fresh air rate of 20 % (at -10 °C); i.e. the mixed air temperatures before the heating coil are 10 or 14 °C.

[2] These operating conditions are not permissible, because the maximum supply air temperature of 60 °C is exceeded.

Legend:
Type = Type of heating/cooling coil
St. = Fan speed
Q = Heating output
H_{max} = Max. mounting height
Δp_W = Water pressure drop
t_S = Supply air temperature
m_W = Water flow rate

Table E4: Heating outputs of the TopVent® commercial CAU

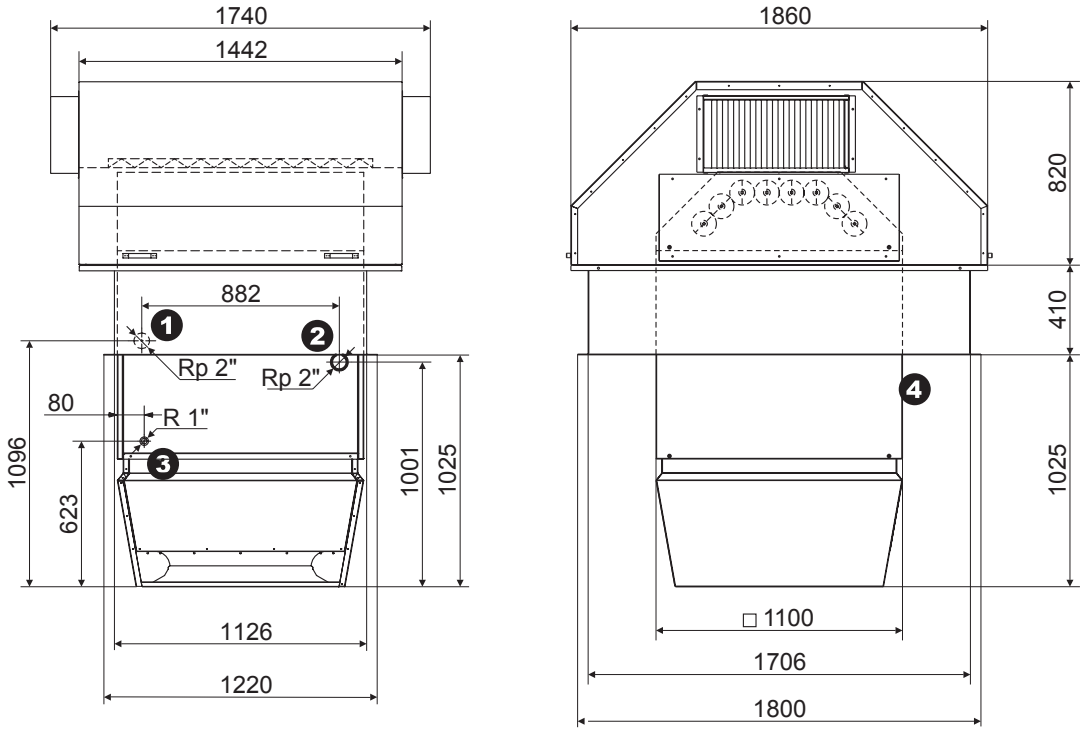
Cooling medium temp.				6/12 °C						8/14 °C					
Type	t_{AI} [1] °C	rh %	St.	Q_{sen} kW	Q_{tot} kW	Δp_W kPa	t_S °C	m_W l/h	m_C kg/h	Q_{sen} kW	Q_{tot} kW	Δp_W kPa	t_S °C	m_W l/h	m_C kg/h
CAU-9/D	24	50	1	27	38	12	11	5495	16	24	30	7	13	4298	9
			2	34	48	17	12	6799	19	30	37	11	14	5291	10
		70	1	27	57	24	12	8164	43	23	49	18	13	6973	36
			2	34	71	35	12	10139	53	29	60	26	14	8631	44
	28	50	1	33	54	21	12	7644	30	29	45	16	14	6453	23
			2	41	66	31	12	9490	36	37	56	23	14	7982	27
		70	1	32	76	40	12	10883	62	29	68	32	14	9685	55
			2	40	95	60	13	13547	77	36	84	48	14	12020	68

[1] The air inlet temperatures (24 or 28 °C) are equal to the room air temperature. The quoted cooling capacities relate to a fresh air rate of 20 % (at +32 °C); i.e. the mixed air temperatures before the heating coil are 25.6 or 28.8 °C.

Legend:
Type = Unit type
t_{AI} = Air inlet temperature
rh = Air inlet humidity
St. = Fan speed
Q_{sen} = Sensitive cooling capacity
Q_{tot} = Total cooling capacity
Δp_W = Water pressure drop
t_S = Supply air temperature
m_W = Water flow rate
m_C = Amount of condensate

Table E5: Cooling capacities of the TopVent® commercial CAU

TopVent® commercial CAU
Technical data



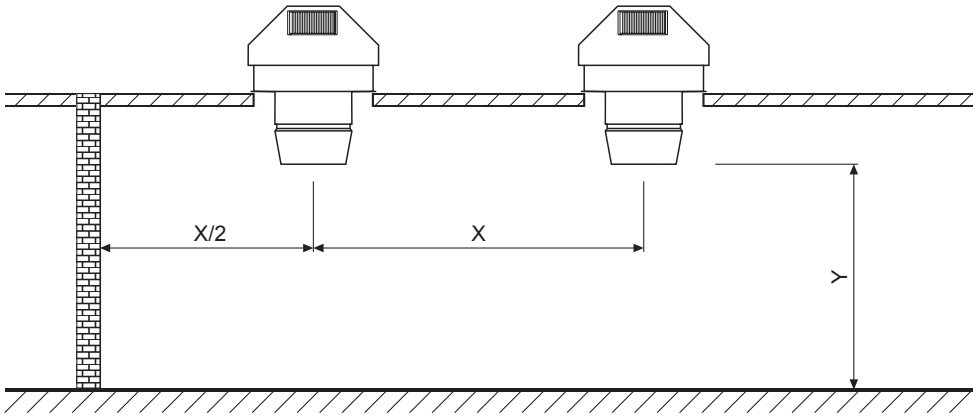
Unit type		CAU-9/D
Weight	kg	510
Water content of the coil	l	14.2

1	Return
2	Flow
3	Condensate drain connection
4	Access panels

Table E6: Dimensions and weights of the TopVent® commercial CAU

Max. operating pressure	800	kPa
Maximum heating medium temperature	120	°C
Maximum supply air temperature	60	°C
Maximum ambient temperature	40	°C
Maximum amount of condensate	150	kg/h
Minimum air flow rate	5000	m³/h

Table E7: Application limits of the TopVent® commercial CAU



Unit type			CAU-9/D	
Fan speed			**1**	**2**
Unit clearance X	min.	m	11	12
	max.	m	21	25
Mounting height Y	min.	m	5	5

Table E8: Minimum and maximum distances

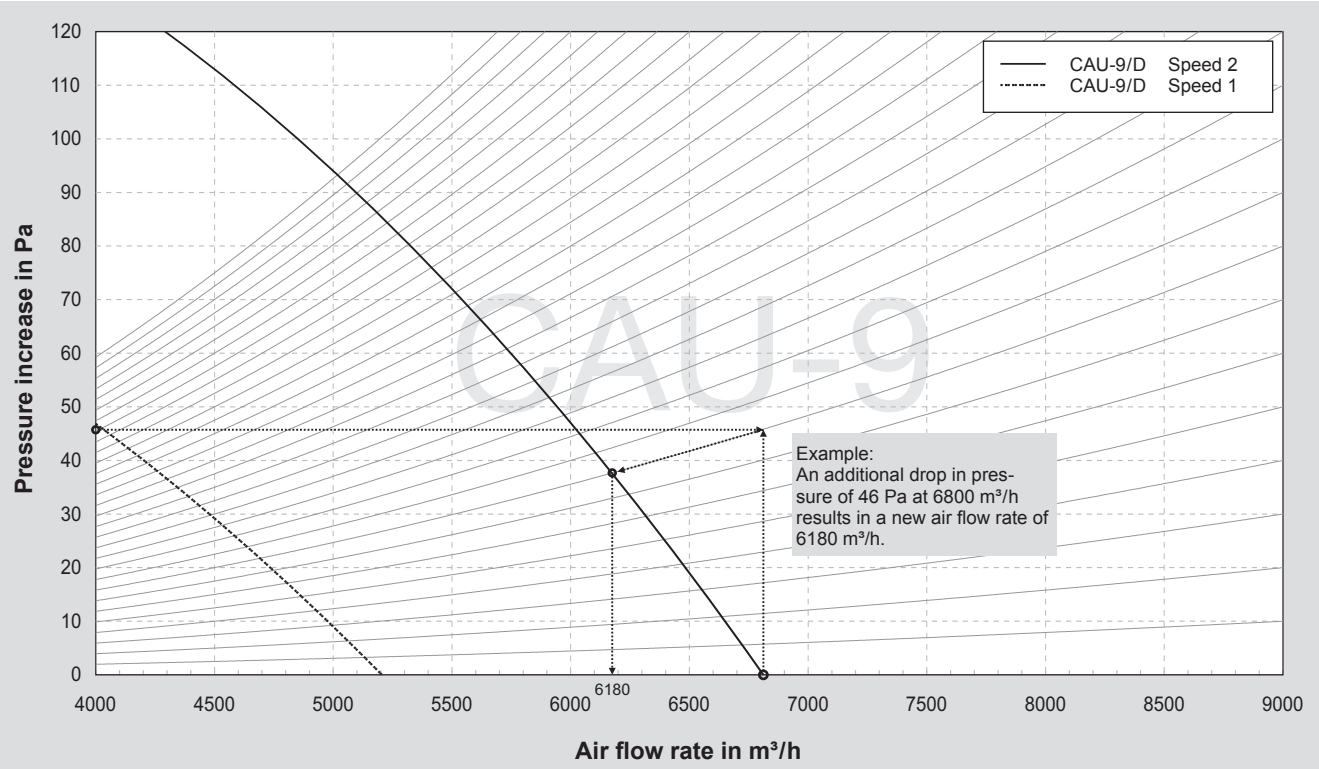


Diagram E1: Air flow rate for TopVent® commercial CAU-9 with additional pressure drop

TopVent® commercial CAU
Design example

4 Design example

The performance data for the most frequent design conditions are specified in Section 3 'Technical Data'. Use the selection program 'HK-Select' to calculate the performance data for other design data (room temperature, cooling medium temperature). You can download 'HK-Select' free of charge on the Internet.

The following design rating example relates to cooling mode. The design rating for heating mode can be performed analogously to the design rating example in Section G 'TopVent® MH'.

Input data ● Geometry of the room (plan) ● Mounting height (= distance between the floor and lower edge of the TopVent® unit) ● Cooling load ● Desired room conditions ● Cooling medium temperature (supply/return line) ● Comfort requirements (acoustic) ● Fresh air temperature ● Minimum fresh air rate (the fresh air rate can be adjusted from 0 % to 100 %; for energy reasons it has to be kept to a minimum in the design conditions).	**Example** Geometry.....65 x 75 m Mounting height.....6 m Cooling load.....175 kW Room conditions.....24 °C / 50 % Cooling medium temperature ....8/14 °C Comfort requirements.....Standard Fresh air temperature.....32 °C Minimum fresh air rate.....20 %
Comfort requirements Define the speed level in accordance with the acoustic requirements: Low noise level → fan speed 1 Normal noise level → fan speed 2	Standard → fan speed 2
Mounting height With the minimum mounting height (Table E8) check whether the unit can be used.	CAU-9/D ✓

TopVent® commercial CAU
Design example

Minimum number

a) Minimum number based on the area
In table E1 it is specified what maximum floor area can be covered by the TopVent® commercial CAU. For a known floor area it is then possible to calculate – for each unit size – the minimum number of units required.

b) Minimum number based on length x width
Depending on the geometry of the hall and in relation to its length and width a certain number of units is required. This can be calculated from the maximum distances between the units and between them and the wall (see Table E8).

c) Minimum number based on the cooling load
Depending on the total cooling capacity required, a minimum number of units can be calculated for each unit size (see Table E5).

Calculate the minimum number of units according to a), b) and c) and enter it in a table for each type of unit.

Calculate the minimum number of units according to a), b) and c) and enter it in a table for each type of unit. Take the highest value as the minimum quantity.

Type	a)	b)	c)		
CAU-9/D	8	9	6	➡	9

Definitive number of units

Choose the final solution from the remaining possibilities, depending on the geometry of the hall and the costs.

9 units of CAU-9/D

External air flow rate

From the air flow rate of the selected units (see Table E1) and the required minimum fresh air rate, calculate the installed fresh air flow rate.

	9 x 6 800 m³/h
Total fresh air flow rate	61 200 m³/h
Minimum fresh air flow rate	12 240 m³/h

TopVent® commercial CAU
Options

5 Options

TopVent® commercial CAU units can be adapted to the requirements of a specific project by means of a series of options. You will find a detailed description of all optional components in Section K 'Options' of this handbook.

Paint finish	at no extra cost in the standard Hoval colours red/orange or for an additional charge in any colour required
Actuator for Air-Injector	for adjustment of the Air-Injector
Acoustic cowl	to reduce the noise level in the room (reduced noise emission from the Air-Injector)
Recirculation silencer	to reduce noise levels in the room (reduced noise reflection from the ceiling)
Insulation	to avoid condensation on the external surfaces of the Air-Injector.
Condensate pump	for condensate drainage through waste water pipes directly below the ceiling or onto the roof
Hydraulic assembly	prefabricated hydraulic assembly for diversion switching

6 Control systems

For the TopVent® commercial CAU there are components for control of the room temperature and of the air distribution that have been specially developed by Hoval and optimally matched to the units. You will find a detailed description of these components in Section L 'Control Systems' of this handbook.

6.1 Room temperature control

TempTronic RC	This is a programmable, electronic temperature controller for fully automatic operation. Its control algorithm with fuzzy logic ensures extremely small control deviations and minimizes energy consumption. The TempTronic RC makes it possible to set a fixed fresh air rate.

6.2 Control of the air distribution

Automatic control by the TempTronic RC	The TempTronic RC also controls the air distribution in accordance with the changing operating conditions (i.e. depending on the speed level and on the temperature difference between the supply air and room air).
Manual control by means of a potentiometer	In applications in which the operating conditions only seldom change or when not such high comfort requirements are made, the air distribution can be manually controlled by a potentiometer.
Fixed setting	In cases where the air distribution always takes place under the same conditions (constant supply air temperature, constant air flow rate), it can have a fixed setting.

6.3 Complete system

DigiNet (detailed description on request)	TopVent® commercial CAU units are ideally controlled by DigiNet. This system, which was developed specially for Hoval indoor climate systems assumes all the control and regulation functions. It regulates the room temperature, controls the air distribution and constantly optimizes the proportion of fresh air (i.e. only as much fresh air as the room temperature permits without additional heating or cooling is blown in). For control by DigiNet a DigiUnit terminal box is installed in the TopVent® commercial CAU unit in place of the standard terminal box.

7 Transport and installation

Transport and assembly work to be carried out only by trained specialists!

A hoist is required for transport and installation of the components! Do not tilt the unit or lay it flat!

7.1 Installation

The TopVent® commercial CAU unit is supplied complete with roof frame and roof hood and is installed from the roof:

- Hook the lifting gear into the 4 lugs on the side of the roof frame.
- Lift the unit onto the roof, turn it to the correct position (coil connections).
- Insert the unit into the roof opening and fasten it.
- Insulate the roof frame and seal it from the outside.

The roof support for the roof frame must be flat and level.

Alternatively installation is also possible in 2 steps: first of all install the roof frame with the roof hood, then remove the roof hood and insert the ventilation unit from above.

7.2 Hydraulic installation

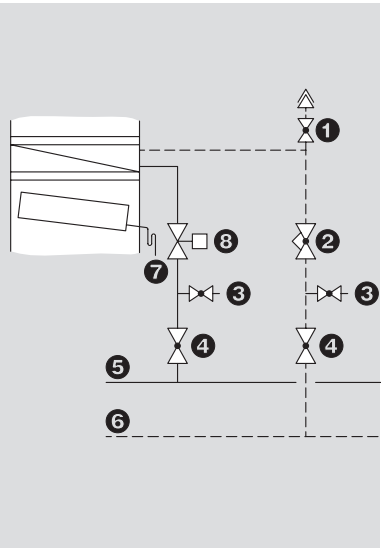
Have the hydraulic installation performed by skilled personnel only!

Use the 'hydraulic assembly' and 'condensate pump' options for quick and easy hydraulic installation!

- Combine units that run under the same operating conditions (room temperature, heat gains, operating time etc.) to form a control group.
- Warm or hot water up to a maximum of 120 °C can be used as the heating medium. For energy saving purposes a pre-regulation of the distributor is possible; however, it has to be ensured that the heat requirement of the individual heating coils can be met in any case.
- Connect the heating/cooling coils in accordance with Fig. E3. Depending on local conditions, check whether compensators for linear expansion are required for the flow and return lines and/or articulated connections are required for the units.

The coil cannot bear any loads, e.g. by means of the flow or return lines!

- Dimension the slopes and cross-section of the condensate drainage line so that no condensate backflow takes place.
- Hydraulically balance the individual units with one another within the control group to ensure uniform pressure admission.



1	Vent with shut-off device
2	Flow control valve
3	Drain cocks
4	Shut-off valves
5	Flow
6	Return
7	Condensate drain (with odour trap)
8	Control valve

Fig. E3: Connection of the heating/cooling coil

7.3 Electrical installation

The electrical connection must be performed up to the unit by a certified skilled electrician. The applicable regulations have to be observed (e.g. EN 60204-1).

The unit is supplied ready to operate.

- Check whether the local operating voltage, frequency and fuse protection coincide with the data on the type plate. If there are any discrepancies, the unit must not be connected!
- For long leads the cable cross-sections must be selected according to the technical regulations, e. g. VDE 0100.
- Perform the electrical installation work in accordance with wiring diagram of the control system.
- Connect the TopVent® commercial CAU in accordance with the terminal diagram.

Connect the thermal contacts that are built into the motor. Only then is the motor protected against overheating.

- Do not forget the main switch for the complete system (control system and units).
- Several TopVent® units can be connected by means of a parallel circuit.

Wire the thermal contacts and isolation switch indicator in series!

- The condensate separator only functions while the fan is running. So switch off the coolant pump together with the fans.

In the case of the version for control by the Hoval DigiNet system the on-site electrical wiring is limited to:

- Connecting lead 3 x 400 VAC / 50 Hz)
- Bus cable (input and output)
- Plug connection for mixing valve to DigiUnit terminal box

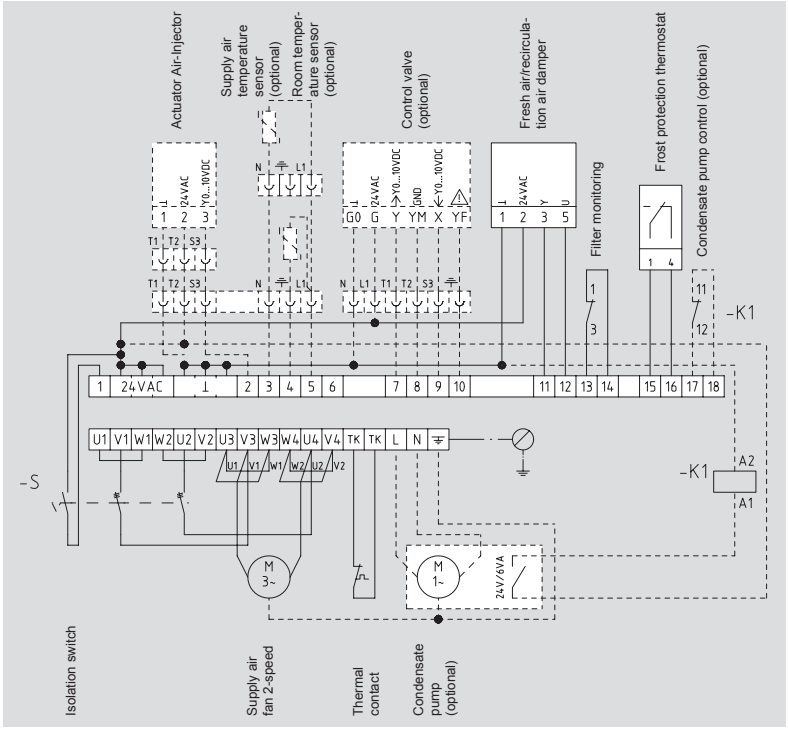


Fig. E4: Terminal diagram for TopVent® commercial CAU as terminal box version

The following electrical connections have to be provided on site for the terminal box version:

- Connecting lead 3 x 400 VAC / 50 Hz)
- Thermal contact
- Supply air temperature sensor (optional)
- Filter monitoring
- Frost protection thermostat
- Actuator for fresh air/recirculation air damper
- Actuator for Air-Injector (optional)
- Condensate pump (optional)
- Control valve plug connection to the terminal box (optional)

TopVent® commercial CAU
Specification texts

8 Specification texts

8.1 TopVent® commercial CAU
Roof unit for ventilating, heating and cooling supermarkets

Housing made of non-corrosive Aluzinc sheet metal, heating/cooling section insulated on the inside.
Heat exchanger consisting of copper tubes and aluminium fins, manifolds and distributor made of steel, incl. pre-assembled frost protection thermostat and an integrated condensate separator with a condensate connection.
Fan unit consisting of a 2-speed, 3-phase external rotor motor with pressure-resistant aluminium sickle-shaped blades, maintenance-free and quiet, with a high degree of efficiency. Motor protection through built-in thermal contacts. Protection class IP54.
Vortex air distributor with a concentric outlet nozzle, 12 adjustable guide vanes, sound attenuation cowl and supply air temperature sensor.
Mounted on roof frame of galvanized steel sheet metal, painted black, with 4 transportation straps.
Aluzinc sheet metal roof hood insulated on inside, with 2 weather grilles and an inspection door.
Two fresh air filters, class G4, with differential pressure control device for filter monitoring.
Aluzinc sheet metal mixed air box with fresh air damper and recirculation damper linked to move in opposite directions; includes actuator.
Terminal box attached on the side in the roof hood, easily accessible behind the inspection door. The following components are installed:
- Isolation switch
- Connecting terminals

The components of the TopVent® unit are fully wired up.

Variant: DigiNet version
DiigUnit terminal box as part of the Hoval DigiNet control system. Installed in the DigiUnit terminal box are the high voltage unit with
- Isolation switch
- Motor protection device per speed
- Fuse for the electronics
- Transformer
- Relay for emergency operation
- Connecting terminals

and the DigiUnit controller. The latter controls and regulates the individual unit, including the air distribution, and is connected via the system bus with the other components of the Hoval DigiNet system. The components of the ventilation unit are fully wired up.

Technical data

Fan speed	1	2	
Nominal air flow rate	_____	_____	m³/h
Floor area reached	_____	_____	m²
Mounting height	_____	_____	m
Nominal heating output	_____	_____	kW
with LPHW	_____	_____	°C
and air inlet temperature	_____	_____	°C
Nominal cooling capacity	_____	_____	kW
with LPCW	_____	_____	°C
air inlet temperature	_____	_____	°C
and air inlet humidity	_____	_____	%
Power consumption	_____	_____	kW
Current consumption	_____	_____	A
Voltage	400 V / 50 Hz		

CAU-9/D

8.2 Options

■ Standard paint finish SL
in the Hoval colours red (RAL 3000) and orange (RAL 2008)

■ Paint finish as desired
in RAL colour No. _____

■ Actuator for Air-Injector VT-AS
with cable and plug for adjustment of the Air-Injector

■ Acoustic cowl AHD
consisting of a sound attenuation cowl of large volume and a screen with a lining of sound attenuation material, insertion attenuation 4 dB(A)

■ Insulation ID
- of the Air-Injector
- of the mixed air box

■ Condensate pump KP
consisting of a centrifugal pump, a drip tray and a plastic hose, max. delivery rate of 150 l/h with a delivery head of 3 m.

■ Hydraulic assembly HG-9/D/AU
consisting of a mixing valve with fast magnetic drive, regulating valve STAD, ball valve, automatic air vent, draining valve, and screwed connections for the coil connection and distribution network.

8.3 Control systems

■ Room temperature control and automatic control of the air distribution by the TempTronic RC
Programmable regulation system with menu-guided operator control for fully-automatic operation of the TopVent® units:

- TempTronic RC, operator control terminal as a wall unit in a plastic housing with an integrated room temperature sensor
- RC station RCS for the power supply and control of several TopVent® units in parallel operation
- RC single station RCE for the power supply and control of a single TopVent® unit
- Actuator VT-AS for automatic adjustment of the air blow-out direction from vertical to horizontal
- Optional module OM for the control of additional functions, as a wall unit in a plastic housing
- Room temperature sensor RF for the connection in place of the room temperature sensor that is integrated into the TempTronic RC, in a plastic housing for wall-mounted installation
- Room temperature mean value MRT4, 4 room temperature sensors for installation in the occupied area

■ Manual control of the air distribution by means of the potentiometer
Manual control by means of potentiometer and actuator for adjustment of the air blow-out direction from vertical to horizontal:

- Potentiometer wall unit PMS-W
- Potentiometer for installation into a control panel PMS-S
- Actuator VT-AS
- Transformer TA for a maximum of 7 actuators

TopVent® commercial CUM

Roof unit for heating and cooling supermarkets

F

TopVent® commercial CUM
Use

1 Use

1.1 Intended use
The TopVent® commercial CUM unit is used to heat and cool large spaces in recirculation mode.
Proper use also includes observance of the mounting, commissioning, operating, and servicing conditions (operating instructions) specified by the manufacturer as well as the consideration of foreseeable abnormal behaviour and residual dangers.

1.2 User group
TopVent® commercial CUM units may only be installed, operated and maintained by authorized and trained skilled personnel. The operating instructions are for English-speaking operating engineers and technicians as well as specialists in building, heating and air technology.

1.3 Operating modes
TopVent® commercial CUM units have the following operating modes:
- Recirculation mode at low fan speed
- Recirculation mode at high fan speed
- Standby
- Off

The application limits specified in the Section 'Technical Data' must be complied with.
Any other or any additional use counts as improper. The manufacturer shall not be responsible for any damages that may result thereby.

The units are not suitable for operation in explosion-prone areas, in wet rooms or in rooms with a high dust incidence.

1.4 Residual dangers
Despite all of the precautionary measures taken, there are residual dangers; these are potential, non-apparent dangers, such as:
- Danger when working on the electrical system.
- When working on the TopVent® unit, parts (e.g. tools) can be dropped.
- Malfunctions due to defective parts
- Danger from hot water when working on the hot water supply.

2 Construction and operation

The TopVent® commercial CUM unit is for the purpose of heating and cooling in recirculation mode; it was developed specially for use in hypermarkets and supermarkets. The unit is installed with its corresponding frame on the roof. It takes in indoor air, heats or cools it and blows it back into the room through the Air-Injector.
Thanks to its high performance and efficient air distribution the TopVent® commercial CUM covers a large area. Therefore, compared to other systems, fewer units are needed to achieve the required conditions.
Thanks to its installation in the roof the units do not protrude so far into the room and maintenance work can be performed from the roof without disturbing operations.

2.1 Unit construction
The TopVent® commercial CUM consists of the following components:
- Recirculation roof hood (with inspection door)
- Roof frame
- Heating/cooling section (with fan, heat exchanger and integrated condensate separator for the condensate incurred)
- automatically adjustable vortex air distributor Air-Injector

The roof hood and the heating/cooling section are insulated to avoid condensation on the external surfaces. The components are bolted together, but can be dismantled separately again.

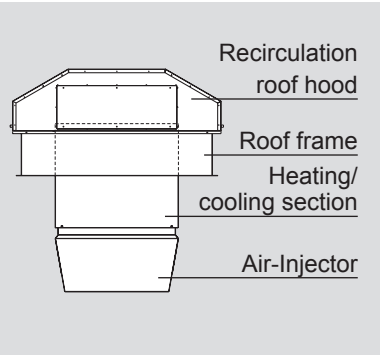
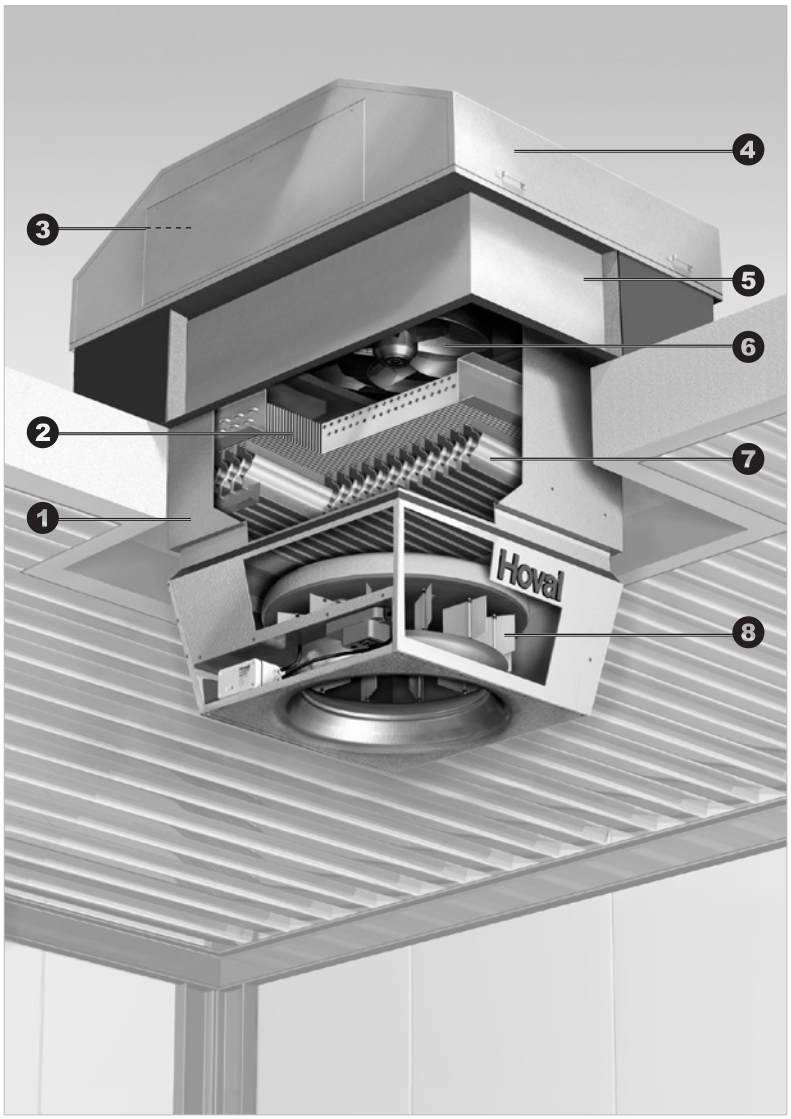


Fig. F1: Components of the TopVent® commercial CUM



❶	Housing: made of corrosion-resistant Aluzinc sheet metal; the heating/cooling section is insulated
❷	Heat exchanger: LPHW/LPCW coil consisting of copper tubes with aluminium fins
❸	Terminal box: with an isolation switch, easily accessible behind the inspection door.
❹	Roof hood insulated, easy to remove with 4 handles
❺	Roof frame: made of sheet steel (insulation on site)
❻	Fan maintenance-free, low-noise sickle fan with a low energy consumption
❼	Condensate separator: with condensate connection
❽	Air-Injector: patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area

Fig. F2: Construction of the TopVent® commercial CUM

2.2 Air distribution by means of the Air-Injector

The patented air distributor – called the Air-Injector – is the core element. The discharge angle of the air is set using the adjustable vanes. It depends on the air flow rate (→ fan speed), the mounting height and the temperature difference between the supply air and room air. The air is therefore blown vertically downwards, conically or horizontally into the room. This ensures that

- with each TopVent® commercial CUM unit a large area of the hall is heated,
- the occupied area is draught-free,
- the temperature stratification in the room is reduced, thus saving energy.

TopVent® commercial CUM
Technical data

3 Technical data

Unit type		CUM-9/D	
Fan speed		**1**	**2**
Rotational speed (nominal)	min^{-1}	660	860
Nominal air flow rate	m³/h	5900	7800
Max. floor area reached [1)]	m²	525	769
Power consumption (at 400 V / 50 Hz)	kW	1.00	1.65
Current consumption (at 400 V / 50 Hz)	A	1.80	3.50

[1)] Mounting height H_{max} = 11 m with a temp. difference between supply air and room air of up to 30 K

Table F1: Technical data of the TopVent® commercial CUM

Type designation code

CUM – 9 / D / DN5

Unit type
TopVent® commercial CUM

Unit size
Size 9

Heat exchanger
Coil type D

Electrical connection
DN5 = DigiNet 5
KK = Terminal box

Table F2: Type designation code

Unit type			CUM-9	
Fan speed			**1**	**2**
Sound pressure level (at a distance of 5 m) [1)]		dB(A)	57	62
Total sound power level		dB(A)	79	84
Octave sound power level	63 Hz	dB	90	93
	125 Hz	dB	85	88
	250 Hz	dB	85	88
	500 Hz	dB	76	81
	1000 Hz	dB	73	78
	2000 Hz	dB	67	72
	4000 Hz	dB	60	66
	8000 Hz	dB	51	57

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

Table F3: Sound power levels of the TopVent® commercial CUM

Air inlet temperature				15 °C					20 °C				
Size	LPHW °C	Type	St.	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h
CUM-9	80/60	D	1	– [1]	–	–	–	–	–	–	–	–	–
			2	–	–	–	–	–	–	–	–	–	–
	60/40	D	1	60	7.9	3	44	2583	50	8.5	2	45	2166
			2	76	10.3	4	43	3257	64	11.2	3	43	2728

[1] These operating conditions are not permissible, because the maximum supply air temperature of 60 °C is exceeded.

Legend:
Type = Type of heating/cooling coil
St. = Fan speed
Q = Heating output
H_{max} = Max. mounting height
Δp_W = Water pressure drop
t_S = Supply air temperature
m_W = Water flow rate

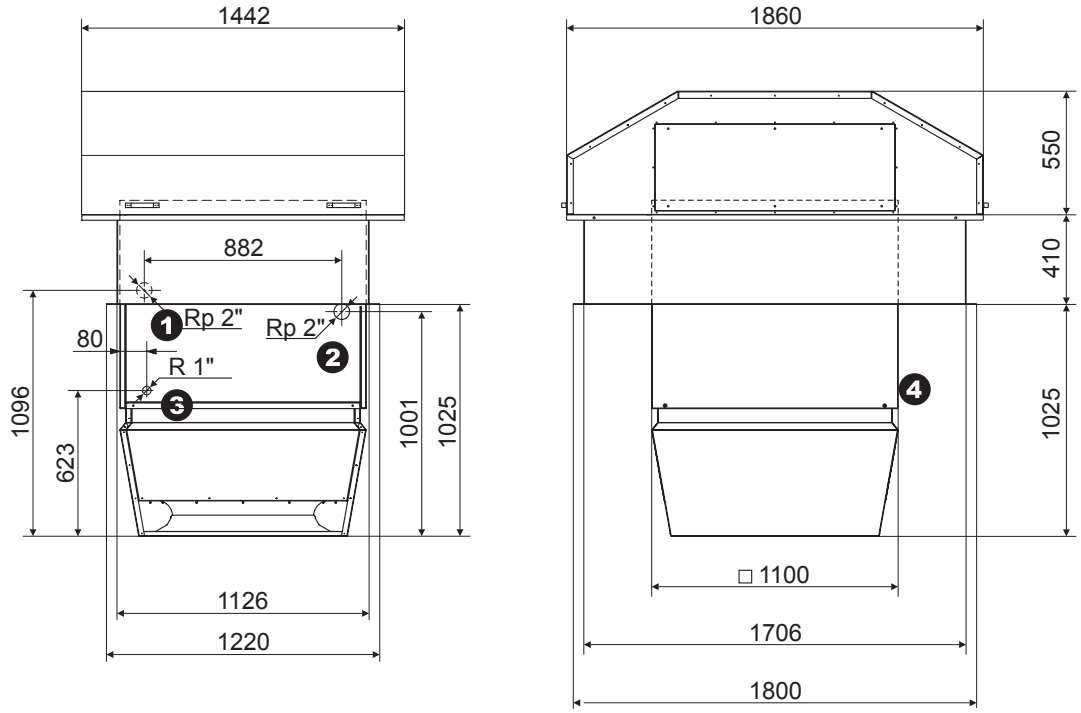
Table F4: Heating outputs of the TopVent® commercial CUM

Cooling medium temp.				6/12 °C						8/14 °C					
Type	t_{AI} °C	rh %	St.	Q_{sen} kW	Q_{tot} kW	Δp_W kPa	t_S °C	m_W l/h	m_C kg/h	Q_{sen} kW	Q_{tot} kW	Δp_W kPa	t_S °C	m_W l/h	m_C kg/h
CUM-9/D	24	50	1	26	31	8	12	4438	8	22	22	4	13	3149	0
			2	32	38	12	12	5486	9	28	28	6	14	3958	0
		70	1	25	49	18	12	7013	34	22	40	12	14	5681	26
			2	32	61	27	12	8713	42	27	49	18	14	7027	31
	28	50	1	33	51	19	12	7248	25	30	41	13	14	5915	17
			2	42	63	29	13	9009	30	37	51	20	14	7321	20
		70	1	33	73	38	12	10521	58	29	64	29	14	9183	50
			2	41	92	56	13	13117	72	37	80	43	15	11412	62

Legend:
Type = Unit type
t_{AI} = Air inlet entry temperature
rh = Air inlet humidity
St. = Fan speed
Q_{sen} = Sensitive cooling capacity
Q_{tot} = Total cooling capacity
Δp_W = Water pressure drop
t_S = Supply air temperature
m_W = Water flow rate
m_C = Amount of condensate

Table F5: Cooling capacities of the TopVent® commercial CUM

TopVent® commercial CUM
Technical data



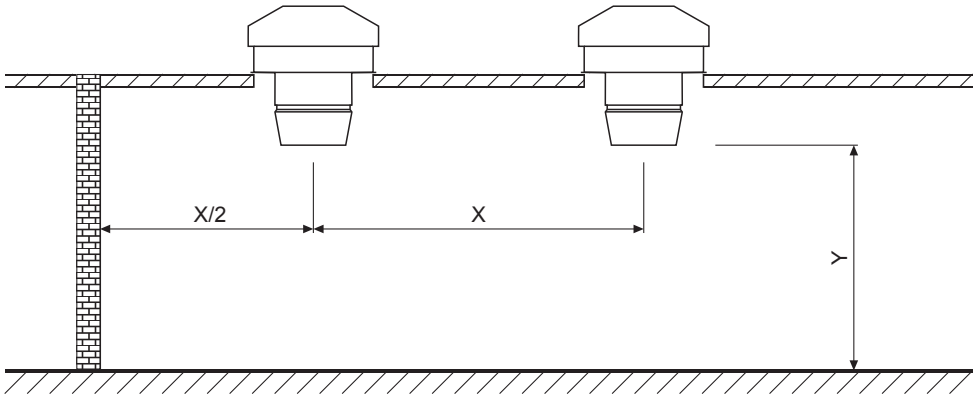
Unit type		CUM-9/D
Weight	kg	430
Water content of the coil	l	14.2

❶	Return
❷	Flow
❸	Condensate drain connection
❹	Access panels

Table F6: Dimensions and weights of the TopVent® commercial CUM

Max. operating pressure	800	kPa
Maximum heating medium temperature	120	°C
Maximum supply air temperature	60	°C
Maximum ambient temperature	40	°C
Maximum amount of condensate	150	kg/h
Minimum air flow rate	5000	m³/h

Table F7: Application limits of the TopVent® commercial CUM



Unit type			CUM-9/D	
Fan speed			**1**	**2**
Unit clearance X	min.	m	11	13
	max.	m	23	28
Mounting height Y	min.	m	5	5

Table E8: Minimum and maximum distances

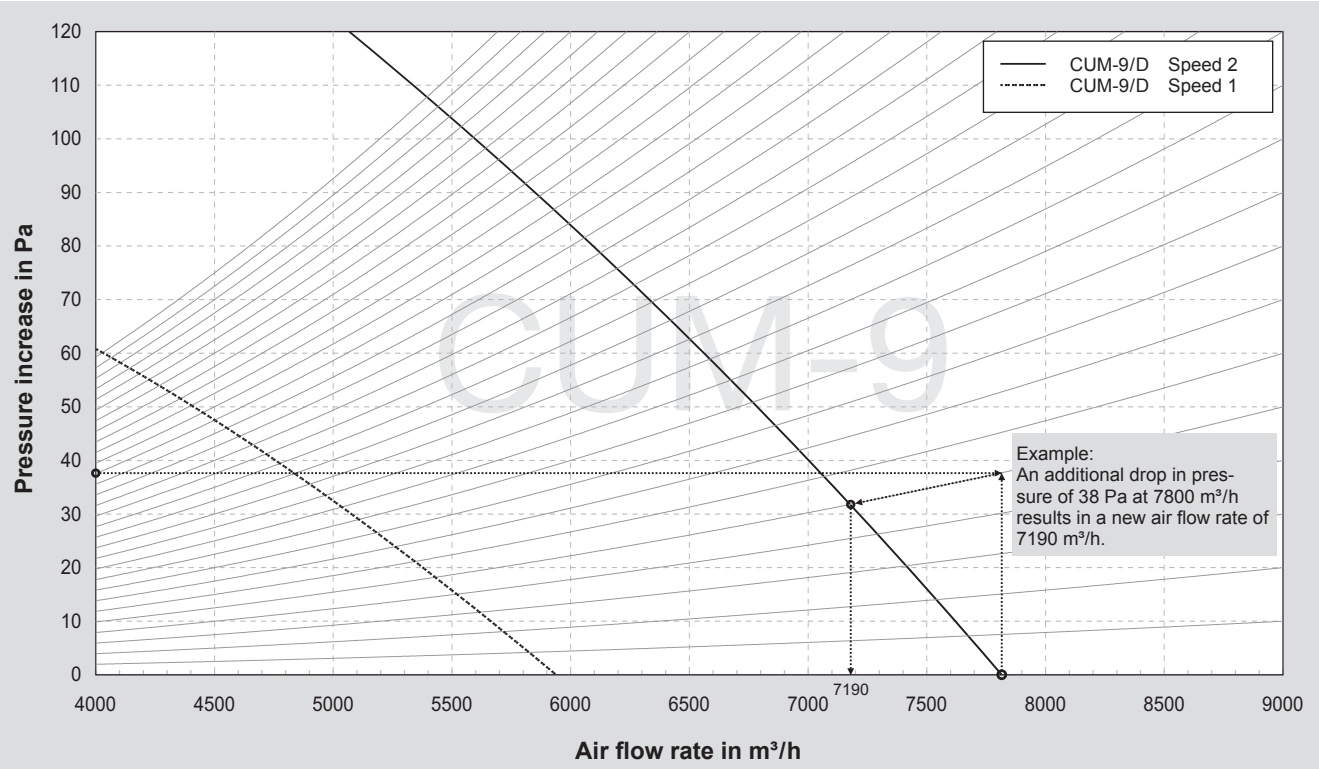


Diagram F1: Air flow rate for TopVent® commercial CUM-9 with additional pressure drop

TopVent® commercial CUM
Design example

4 Design example

The performance data for the most frequent design conditions are specified in Section 3 'Technical Data'. Use the selection program 'HK-Select' to calculate the performance data for other design data (room temperature, cooling medium temperature). You can download 'HK-Select' free of charge on the Internet.

The following design rating example relates to cooling mode. The design rating for heating mode can be performed analogously to the design rating example in Section B 'TopVent® DHV'.

Input data ● Geometry of the room (plan) ● Mounting height (= distance between the floor and lower edge of the TopVent® unit) ● Cooling load ● Desired room conditions ● Cooling medium temperature (flow/return) ● Comfort requirements (acoustic)	**Example** Geometry.....40 x 90 m Mounting height.....7 m Cooling load.....255 kW Room conditions.....28 °C / 50 % Cooling medium temperature ....6/12 °C Comfort requirements.....Standard
Comfort requirements Define the speed level in accordance with the acoustic requirements: Low noise level → fan speed 1 Normal noise level → fan speed 2	Standard → fan speed 2
Mounting height With the minimum mounting height (Table F8) check whether the unit can be used.	CUM-9/D ✓
Minimum number a) Minimum number based on the area In table F1 it is specified what maximum floor area can be covered by the TopVent® commercial CUM. For a known floor area it is then possible to calculate – for each unit size – the minimum number of units required. b) Minimum number based on length x width Depending on the geometry of the hall and in relation to its length and width a certain number of units is required. This can be calculated from the maximum distances between the units and between them and the wall (see Table F8). c) Minimum number based on the cooling load Depending on the total cooling capacity required the minimum number of units can be calculated for each unit size (see Table F5). The highest number from results a), b) and c) is the actual minimum number required.	Calculate the minimum number of units according to a), b) and c) and enter it in a table for each type of unit. Take the highest value as the minimum quantity. **Type** | **a)** | **b)** | **c)** CUM-9/D | 5 | 8 | 6 ➡ 8

TopVent® commercial CUM
Design example

Definitive number of units Choose the final solution from the remaining possibilities, depending on the geometry of the hall and the costs.	8 units of CUM-9/D

TopVent® commercial CUM Options

5 Options

TopVent® commercial CUM units can be adapted to the requirements of a specific project by means of a series of options. You will find a detailed description of all optional components in Section K 'Options' of this handbook.

Paint finish	at no extra cost in the standard Hoval colours red/orange or for an additional charge in any colour required
Actuator for Air-Injector	for adjustment of the Air-Injector
Flat filter box	to filter recirculation air
Acoustic cowl	to reduce the noise level in the room (reduced noise emission from the Air-Injector)
Insulation	to avoid condensation on the external surfaces of the Air-Injector.
Condensate pump	for condensate drainage through waste water pipes directly below the ceiling or onto the roof
Hydraulic assembly	prefabricated hydraulic assembly for diversion switching

6 Control systems

For the TopVent® commercial CUM there are components for control of the room temperature and of the air distribution that have been specially developed by Hoval and optimally matched to the units. You will find a detailed description of these components in Section L 'Control Systems' of this handbook.

6.1 Room temperature control

TempTronic RC	This is a programmable, electronic temperature controller for fully automatic operation. Its control algorithm with fuzzy logic ensures extremely small control deviations and minimizes energy consumption.

6.2 Control of the air distribution

Automatic control by the TempTronic RC	The TempTronic RC also controls the air distribution in accordance with the changing operating conditions (i.e. depending on the speed level and on the temperature difference between the supply air and room air).
Manual control by means of a potentiometer	In applications in which the operating conditions only seldom change or when not such high comfort requirements are made, the air distribution can be manually controlled by a potentiometer.
Fixed setting	In cases where the air distribution always takes place under the same conditions (constant supply air temperature, constant air flow rate), it can have a fixed setting.

6.3 Complete system

DigiNet (detailed description on request)	TopVent® commercial CUM units are ideally controlled by DigiNet. This system, which was developed specially for Hoval indoor climate systems assumes all the control and regulation functions. It regulates the room temperature and controls the air distribution in fully automatic mode. For control by DigiNet a DigiUnit terminal box is installed in the TopVent® commercial CUM unit in place of the standard terminal box.

7 Transport and installation

Transport and assembly work to be carried out only by trained specialists!

A hoist is required for transport and installation of the components! Do not tilt the unit or lay it flat!

7.1 Installation

The TopVent® commercial CUM is supplied as a complete unit with roof frame and roof hood and is installed from the roof:

- Hook the lifting gear into the 4 lugs on the side of the roof frame.
- Lift the unit onto the roof and turn it to the correct position (coil connections).
- Insert the unit into the roof opening and fasten it.
- Insulate and seal the roof frame from the outside.

The roof support for the roof frame must be flat and level.

Alternatively installation is also possible in 2 steps: first of all install the roof frame with the roof hood, then remove the roof hood and insert the ventilation unit from above.

7.2 Hydraulic Installation

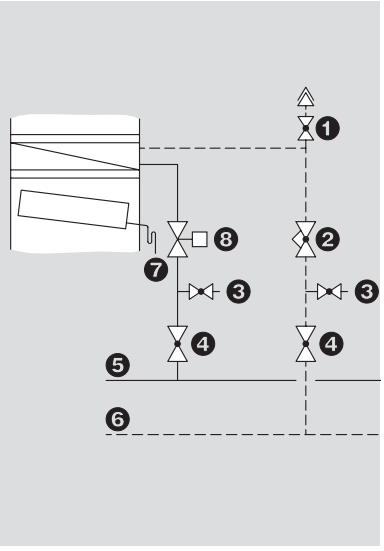
Have the hydraulic installation performed by skilled personnel only!

Use the 'hydraulic assembly' and 'condensate pump' options for quick and easy hydraulic installation!

- Combine units that run under the same operating conditions (room temperature, heat gains, operating time etc.) to form a control group.
- Warm or hot water up to a maximum of 120 °C can be used as the heating medium. For energy saving purposes a pre-regulation of the distributor is possible; however, it has to be ensured that the heat requirement of the individual heating coils can be met in any case.
- Connect the heating/cooling coils in accordance with Fig. F3. Depending on local circumstances it has to be checked whether compensators for the supply and return lines for compensation of the linear expansion and/or articulated connections are required for the units.

The coil cannot bear any loads, e.g. by means of the flow or return lines!

- Dimension the slopes and cross-section of the condensate drainage line so that no condensate backflow takes place.
- Hydraulically balance the individual units with one another within the control group to ensure uniform pressure admission.



1	Vent with shut-off device
2	Flow control valve
3	Drain cocks
4	Shut-off valves
5	Flow
6	Return
7	Condensate drain (with odour trap)
8	Control valve

Fig. F3: Connection of the heating/cooling coil

7.3 Electrical installation

The electrical connection must be performed up to the unit by a certified skilled electrician. The applicable regulations have to be observed (e.g. EN 60204-1).

The unit is supplied ready to operate.

- Check whether the local operating voltage, frequency and fuse protection match the data on the type plate. If there are any discrepancies, the unit must not be connected!
- For long leads the cable cross-sections must be selected according to the technical regulations, e. g. VDE 0100.
- Perform the electrical installation work in accordance with wiring diagram of the control system.
- Connect the TopVent® commercial CUM in accordance with the terminal diagram.

Connect the thermal contacts that are built into the motor. Only then is the motor protected against overheating.

- Do not forget the main switch for the complete system (control system and units).
- Several TopVent® units can be connected by means of a parallel circuit.

Wire the thermal contacts and isolation switch indicator in series!

- The condensate separator only functions while the fan is running. So switch off the coolant pump together with the fans.

In the case of the version for control by the Hoval DigiNet the on-site electrical wiring is limited to:

- Connecting lead 3 x 400 VAC / 50 Hz)
- Bus cable (input and output)
- Plug connection for mixing valve to DigiUnit terminal box

The following electrical connections have to be provided on site for the terminal box version:

- Connecting lead 3 x 400 VAC / 50 Hz)
- Thermal contact
- Supply air temperature sensor (optional)
- Filter monitoring
- Actuator for Air-Injector (optional)
- Condensate pump (optional)
- Control valve plug connection to the terminal box (optional)

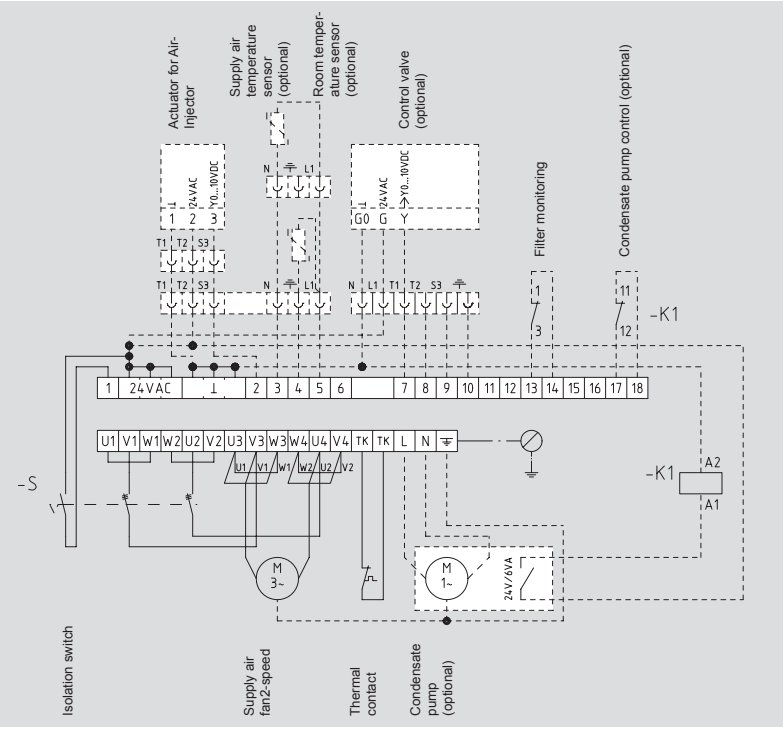


Fig. E4: Terminal diagram for TopVent® commercial CUM as a terminal box version

TopVent® commercial CUM
Specification texts

8 Specification texts

8.1 TopVent® commercial CUM
Roof unit for heating and cooling supermarkets

Housing made of corrosion-resistant Aluzinc sheet metal, inside of heating and cooling unit insulated.
Heat exchanger consisting of copper tubes and aluminium fins, manifolds and distributor made of steel, incl. pre-assembled frost protection thermostat and an integrated condensate separator with a condensate connection.
Fan unit consisting of a 2-speed, 3-phase external rotor motor with pressure-resistant aluminium sickle-shaped blades, maintenance-free and quiet, with a high degree of efficiency. Motor protection through built-in thermal contacts. Protection class IP54.
Vortex air distributor with a concentric outlet nozzle, 12 adjustable guide vanes, sound attenuation cowl and supply air temperature sensor.
Mounted on roof frame of galvanized sheet steel, painted black, with 4 transportation straps.
Roof hood insulated inside made of Aluzinc sheet metal with inspection cover.
Terminal box attached on the side in the roof hood, easily accessible behind the inspection cover. The following components are installed:
- Isolation switch
- Connecting terminals

The components of the TopVent® unit are fully wired up.

Variant: DigiNet version
DigiUnit terminal box as part of the Hoval DigiNet control system. Installed in the DigiUnit terminal box are the high voltage unit with
- Isolation switch
- Motor protection device per speed
- Fuse for the electronics
- Transformer
- Relay for emergency operation
- Connecting terminals

and the DigiUnit controller. The latter controls and regulates the individual unit, including the air distribution, and is connected via the system bus with the other components of the Hoval DigiNet system. The components of the ventilation unit are fully wired up.

Technical data

Fan speed	1	2	
Nominal air flow rate	_____	_____	m³/h
Floor area reached	_____	_____	m²
Mounting height	_____	_____	m
Nominal heating output	_____	_____	kW
with LPHW	_____	_____	°C
and air inlet temperature	_____	_____	°C
Nominal cooling capacity	_____	_____	kW
with LPCW	_____	_____	°C
air inlet temperature	_____	_____	°C
and air inlet humidity	_____	_____	%
Power consumption	_____	_____	kW
Current consumption	_____	_____	A
Voltage	400 V / 50 Hz		

CUM-9/D

8.2 Options

■ Standard paint finish SL
in the Hoval colours red (RAL 3000) and orange (RAL 2008)

■ Paint finish as desired
in RAL colour No. _____

■ Actuator for Air-Injector VT-AS
with cable and plug for adjustment of the Air-Injector

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

■ Acoustic cowl AHD
consisting of a sound attenuation cowl of large volume and a screen with a lining of sound attenuation material, insertion attenuation 4 dB(A)

■ Insulation ID
of the Air-Injector

■ Condensate pump KP
consisting of a centrifugal pump, a drip tray and a plastic hose, max. delivery rate of 150 l/h with a delivery head of 3 m.

■ Hydraulic assembly HG-9/D/UM
consisting of a mixing valve with a correction time of 30 s, regulating valve STAD, ball valve, automatic air vent, draining valve, and screwed connections for the coil connection and distribution network.

8.3 Control systems

■ Room temperature control and automatic control of the air distribution by the TempTronic RC
Programmable regulation system with menu-guided operator control for fully-automatic operation of the TopVent® units:

- TempTronic RC, operator control terminal as a wall unit in a plastic housing with an integrated room temperature sensor
- RC station RCS for the power supply and control of several TopVent® units in parallel operation
- RC single station RCE for the power supply and control of a single TopVent® unit
- Actuator VT-AS for automatic adjustment of the air blow-out direction from vertical to horizontal
- Optional module OM for the control of additional functions, as a wall unit in a plastic housing
- Room temperature sensor RF for the connection in place of the room temperature sensor that is integrated into the TempTronic RC, in a plastic housing for wall-mounted installation
- Room temperature mean value MRT4, 4 room temperature sensors for installation in the occupied area

■ Manual control of the air distribution by means of the potentiometer
Manual control by means of potentiometer and actuator for adjustment of the air blow-out direction from vertical to horizontal:

- Potentiometer wall unit PMS-W
- Potentiometer for installation into a control panel PMS-S
- Actuator VT-AS
- Transformer TA for a maximum of 7 actuators

TopVent® MH

Supply air unit for ventilating and heating high spaces

TopVent® MH
Use

1 Use

1.1 Intended use
The TopVent® MH unit is used to ventilate and heat large spaces with a variable fresh air supply.
Proper use also includes observance of the installation, commissioning, operating, and maintenance conditions (operating instructions) specified by the manufacturer as well as the consideration of foreseeable abnormal behaviour and residual dangers.

1.2 User group
TopVent® MH units may only be installed, operated and maintained by authorized and trained skilled personnel. The operating instructions are for English-speaking operating engineers and technicians as well as specialists in building, heating and air technology.

1.3 Operating Modes
TopVent® MH units have the following operating modes:
- Fresh air, mixed air or recirculation mode with low fan speed (0... 100 % fresh air)
- Fresh air, mixed air or recirculation mode with high fan speed (0... 100 % fresh air)
- Standby
- Off

The application limits specified in the Section 'Technical Data' must be complied with.
Any other or any additional use counts as improper. The manufacturer shall not be responsible for any damages that may result thereby.

The units are not suitable for operation in explosion-prone areas, in wet rooms or in rooms with a high dust incidence.

1.4 Residual dangers
Despite all of the precautionary measures taken, there are residual dangers; these are potential, non-apparent dangers, such as:
- Danger when working on the electrical system.
- When working on the TopVent® unit, parts (e.g. tools) can be dropped.
- Malfunctions due to defective parts
- Danger from hot water when working on the hot water supply.

2 Construction and operation

The TopVent® MH unit is used to ventilate and heat in fresh air, mixed air or recirculation mode; it was developed specially for use in large spaces. The unit is installed under the ceiling and connected to a fresh air duct. Depending on the position of the dampers it draws in fresh air and/or indoor air, heats it in the heating coil and blows it into the room through the Air-Injector.
Thanks to its high performance and efficient air distribution the TopVent® MH covers a large area. Therefore, compared to other systems, fewer units are needed to achieve the required conditions.
3 unit sizes, 2-speed fans, various coil types and a series of accessories make it possible to provide a customized solution for any hall. Special coils (hot water, steam, electric heating coils) are also available.

2.1 Unit construction
The TopVent® MH consists of the following components:
- Mixed air box (with fresh air and recirculation air dampers linked to move in opposite directions)
- Filter box (with two bag filters class G4)
- Heating section (with fan and heating coil)
- Automatically adjustable vortex air distributor Air-Injector

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

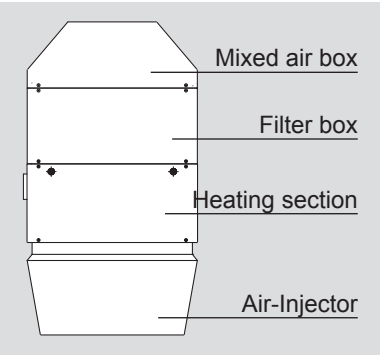
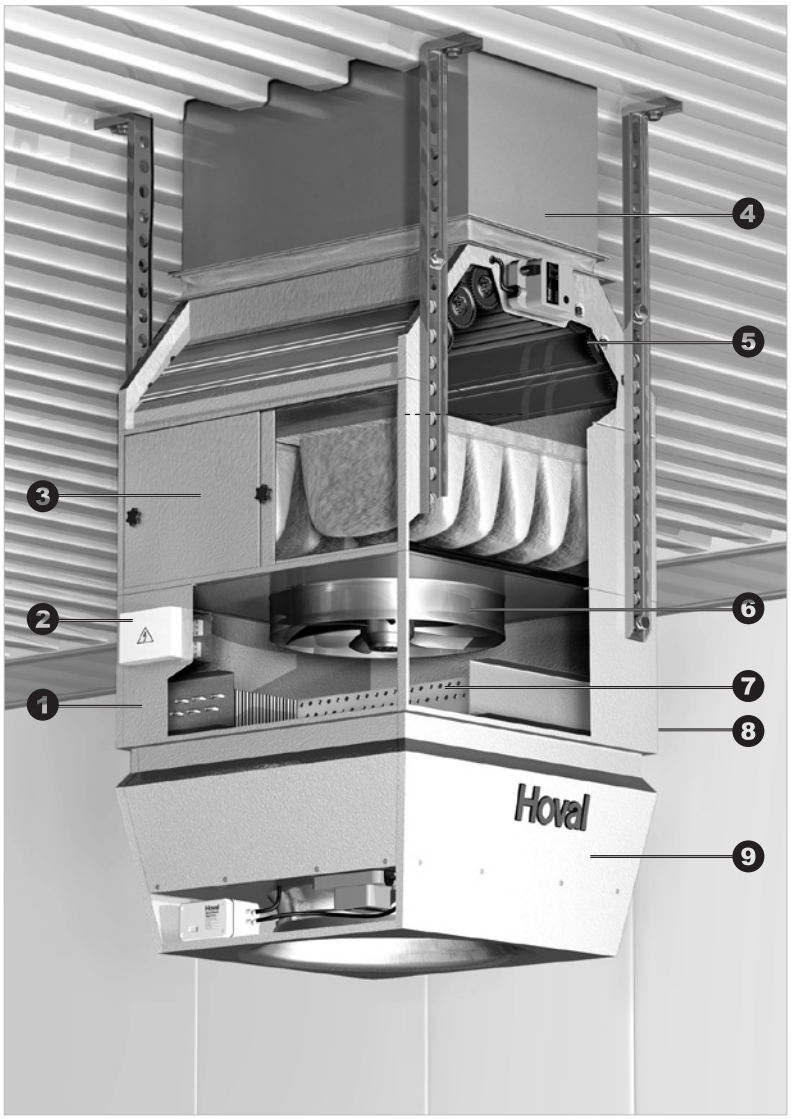


Table G1: Components of the TopVent® MH



❶	Housing: made of corrosion-resistant Aluzinc sheet metal
❷	Terminal box
❸	Filter box: easily accessible behind the sliding door, with 2 class G4 bag filters and a differential pressure control device for filter monitoring
❹	Fresh air duct with canvas connection (not included in Hoval delivery specifications)
❺	Mixed air box: with fresh air and recirculation air dampers made of extruded aluminium profile section and plastic gearwheels and an actuator
❻	Fan: maintenance-free, low-noise sickle fan with a low energy consumption
❼	Heat exchanger: LPHW heating coil consisting of copper tubes with aluminium fins
❽	Frost protection thermostat: installed in the heat exchanger
❾	Air-Injector: patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area

Table G2: Construction of the TopVent® MH

2.2 Air distribution by means of the Air-Injector

The patented air distributor – called the Air-Injector – is the core element. The discharge angle of the air is set using the adjustable vanes. It depends on the air flow rate (→ fan speed), the mounting height and the temperature difference between the supply air and room air. The air is therefore blown vertically downwards, conically or horizontally into the room. This ensures that

- with each TopVent® MH unit a large area of the hall is heated,
- the occupied area is draught-free,
- the temperature stratification in the room is reduced, thus saving energy.

TopVent® MH
Technical data

3 Technical data

Unit type		MH-6/A		MH-6/B		MH-6/C	
Fan speed		**1**	**2**	**1**	**2**	**1**	**2**
Rotational speed (nominal)	min^{-1}	690	900	690	900	690	900
Nominal air flow rate [1]	m³/h	3400	4600	3400	4600	3100	4200
Max. floor area reached [2]	m²	276	385	276	385	251	347
Power consumption (at 400 V / 50 Hz)	kW	0.48	0.69	0.48	0.69	0.48	0.69
Current consumption (at 400 V / 50 Hz)	A	0.78	1.25	0.78	1.25	0.78	1.25
Unit type		**MH-9/A**		**MH-9/B**		**MH-9/C**	
Fan speed		**1**	**2**	**1**	**2**	**1**	**2**
Rotational speed (nominal)	min^{-1}	680	900	680	900	680	900
Nominal air flow rate [1]	m³/h	5300	7100	5300	7100	5000	6600
Max. floor area reached [2]	m²	458	674	458	674	426	610
Power consumption (at 400 V / 50 Hz)	kW	0.70	0.98	0.70	0.98	0.70	0.98
Current consumption (at 400 V / 50 Hz)	A	1.15	1.75	1.15	1.75	1.75	1.75
Unit type		**MH-10/A**		**MH-10/B**		**MH-10/C**	
Fan speed		**1**	**2**	**1**	**2**	**1**	**2**
Rotational speed (nominal)	min^{-1}	660	860	660	860	660	860
Nominal air flow rate [1]	m³/h	6200	8100	6200	8100	5800	7600
Max. floor area reached [2]	m²	561	811	561	811	514	741
Power consumption (at 400 V / 50 Hz)	kW	0.99	1.53	0.99	1.53	0.99	1.53
Current consumption (at 400 V / 50 Hz)	A	1.77	3.35	1.77	3.35	1.77	3.35

[1] Please consider the additional pressure drop of the fresh air duct
[2] Mounting height H_{max} = 11 m with a temperature difference between supply air and room air of up to 30 K

Table G1: Technical data of the TopVent® MH

Type designation code

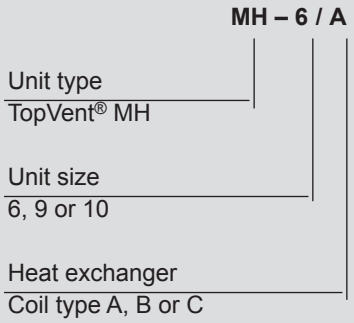


Table G2: Type designation code

Unit type			MH-6		MH-9		MH-10	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Sound pressure level (at a distance of 5 m) [1]		dB(A)	46	52	51	57	60	67
Total sound power level		dB(A)	68	74	73	79	82	89
Octave sound power level	63 Hz	dB	74	78	78	82	93	98
	125 Hz	dB	72	78	73	82	86	93
	250 Hz	dB	67	75	73	78	86	93
	500 Hz	dB	63	69	67	73	79	86
	1000 Hz	dB	63	70	69	74	76	83
	2000 Hz	dB	60	67	67	74	70	77
	4000 Hz	dB	53	61	61	67	63	71
	8000 Hz	dB	46	54	54	61	54	62

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

Table G3: Sound power levels of the TopVent® MH

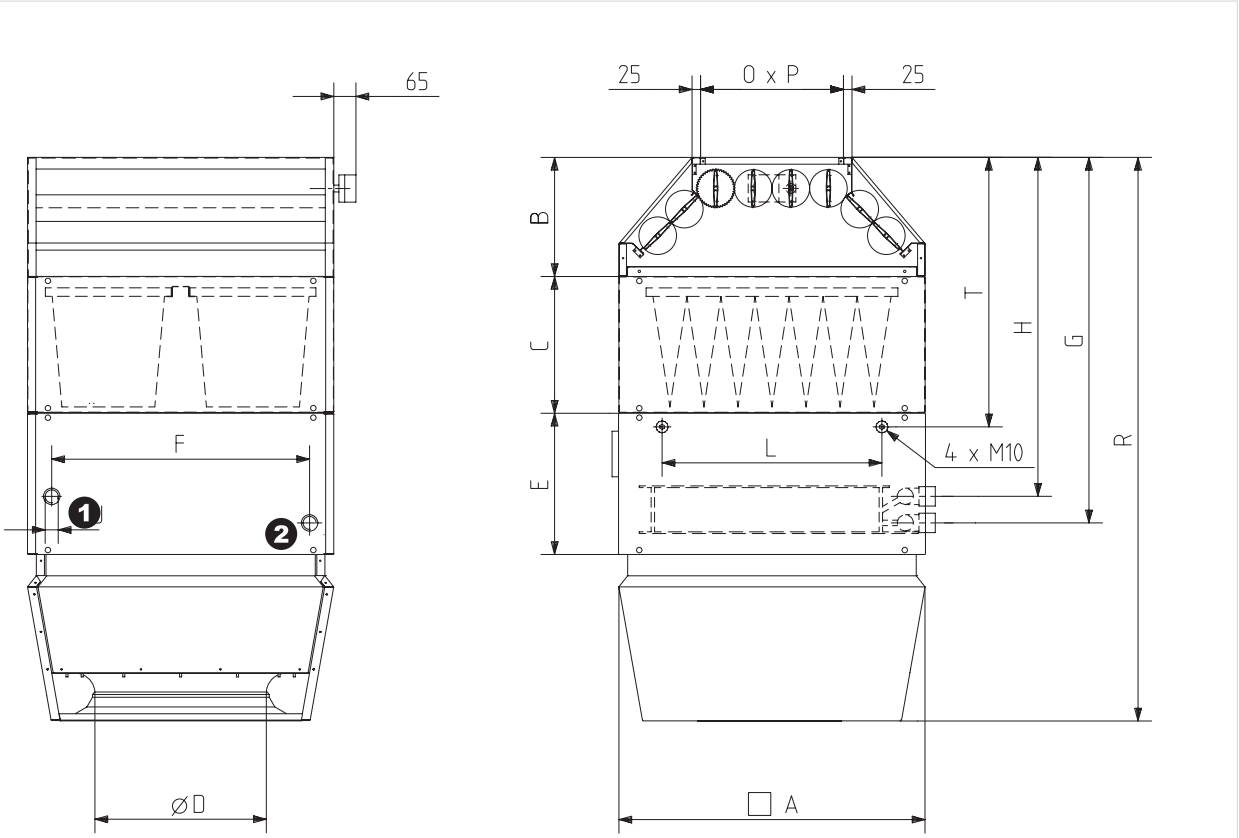
Air inlet temperature [1]				15 °C					20 °C				
Size	LPHW °C	Type	St.	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h
MH-6	80/60	A	1	27	8	4	34	1155	25	8.6	4	36	1073
			2	32	11.2	6	31	1379	30	12.2	5	33	1282
		B	1	37	6.7	8	42	1600	35	7.2	7	44	1485
			2	45	9.3	11	39	1941	42	9.9	10	41	1803
		C	1	51	5.2	6	58	2166	47	5.5	5	58	2012
			2	64	6.9	9	54	2744	59	7.3	8	55	2548
	60/40	A	1	17	10.6	2	25	714	15	12.3	2	27	631
			2	19	15.2	3	23	851	18	18.1	2	26	751
		B	1	23	8.7	3	30	988	20	9.8	3	32	871
			2	28	12.2	5	28	1195	25	13.9	4	30	1053
		C	1	32	6.5	3	40	1359	28	7.1	2	41	1204
			2	40	8.7	4	38	1716	36	9.6	3	39	1518
MH-9	80/60	A	1	46	8.3	4	36	1978	43	8.9	4	38	1838
			2	55	11.5	6	33	2357	51	12.5	5	35	2190
		B	1	58	7.4	6	42	2476	54	7.9	6	44	2298
			2	70	10.1	9	39	2984	65	10.8	8	41	2770
		C	1	81	5.8	5	57	3458	75	6.2	5	58	3212
			2	100	8	8	54	4288	93	8.1	7	55	3982
	60/40	A	1	28	11.0	2	26	1219	25	12.6	1	28	1076
			2	34	15.5	3	24	1449	30	18.2	2	27	1278
		B	1	36	9.6	3	30	1525	31	10.8	2	32	1344
			2	43	13.3	4	28	1831	38	15.2	3	30	1613
		C	1	51	7.3	2	40	2169	45	8.0	2	40	1920
			2	62	9.7	4	38	2679	55	10.6	3	39	2370
MH-10	80/60	A	1	51	9.9	5	34	2176	47	10.6	4	37	2021
			2	59	13.4	7	32	2544	55	14.6	6	34	2363
		B	1	64	8.7	8	40	2740	59	9.3	7	42	2543
			2	76	11.7	10	38	3237	70	12.6	9	40	3004
		C	1	91	6.7	7	56	3884	84	7.1	6	56	3608
			2	111	8.8	10	53	4766	103	9.3	8	54	4425
	60/40	A	1	31	13.2	2	25	1339	28	15.3	2	28	1181
			2	36	18.3	3	24	1562	32	21.7	2	26	1378
		B	1	39	11.4	3	29	1684	35	13.0	3	31	1484
			2	46	15.6	4	27	1983	41	17.9	4	29	1746
		C	1	57	8.5	3	39	2431	50	9.3	2	40	2151
			2	69	11.2	4	37	2971	61	12.4	3	40	2628

[1] The air inlet temperatures (15 or 20 °C) are equal to the room air temperature.The quoted heating outputs relate to a fresh air rate of 20 % (at -10 °C); i.e. the mixed air temperatures before the heating coil are 10 or 14 °C.

Legend:
Type = Type of heating coil
St. = Fan speed
Q = Heating output
H_{max} = Max. mounting height
Δp_W = Water pressure drop
t_S = Supply air temperature
m_W = Water flow rate

Table G4: Heating outputs of the TopVent® MH

TopVent® MH
Technical data



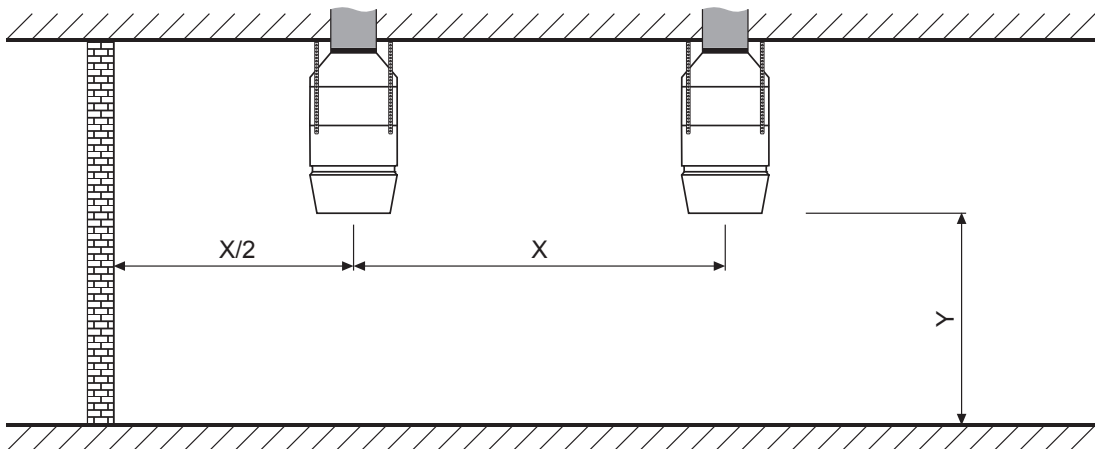
Unit type		MH-6			MH-9			MH-10		
A	mm	900			1100			1000		
B	mm	355			360			360		
C	mm	400			400			400		
Ø D	mm	500			630			630		
E	mm	415			480			601		
F	mm	758			882			882		
G	mm	1077			1127			1248		
H	mm	999			1049			1170		
J	"	1¼ (BSP female)			1½ (BSP female)			1½ (BSP female)		
L	mm	594			846			846		
O x P	mm	420 x 850			500 x 1050			500 x 1050		
R	mm	1660			1810			1932		
T	mm	795			800			800		
Weight	kg	147			208			242		
Water content of the coil	Type	A	B	C	A	B	C	A	B	C
	l	3.1	3.1	6.2	4.7	4.7	9.4	4.7	4.7	9.4

❶	Return
❷	Flow

Table G5: Dimensions and weights of the TopVent® MH

Max. operating pressure	800	kPa
Maximum heating medium temperature	120	°C
Maximum supply air temperature	60	°C
Maximum ambient temperature	40	°C

Table G6: Application limits of the TopVent® MH



Unit type				**MH-6/A**		**MH-6/B**		**MH-6/C**	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Unit clearance X	min.	m	9	10	9	10	9	10
	max.	m	17	20	17	20	16	19
Mounting height Y	min.	m	4	4	4	4	4	4
Unit type				**MH-9/A**		**MH-9/B**		**MH-9/C**
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Unit clearance X	min.	m	11	13	11	13	11	12
	max.	m	21	26	21	26	21	25
Mounting height Y	min.	m	5	5	5	5	5	5
Unit type				**MH-10/A**		**MH-10/B**		**MH-10/C**
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Unit clearance X	min.	m	12	13	12	13	11	13
	max.	m	24	28	24	28	23	27
Mounting height Y	min.	m	5	5	5	5	5	5

Table G7: Minimum and maximum distances

TopVent® MH
Technical data

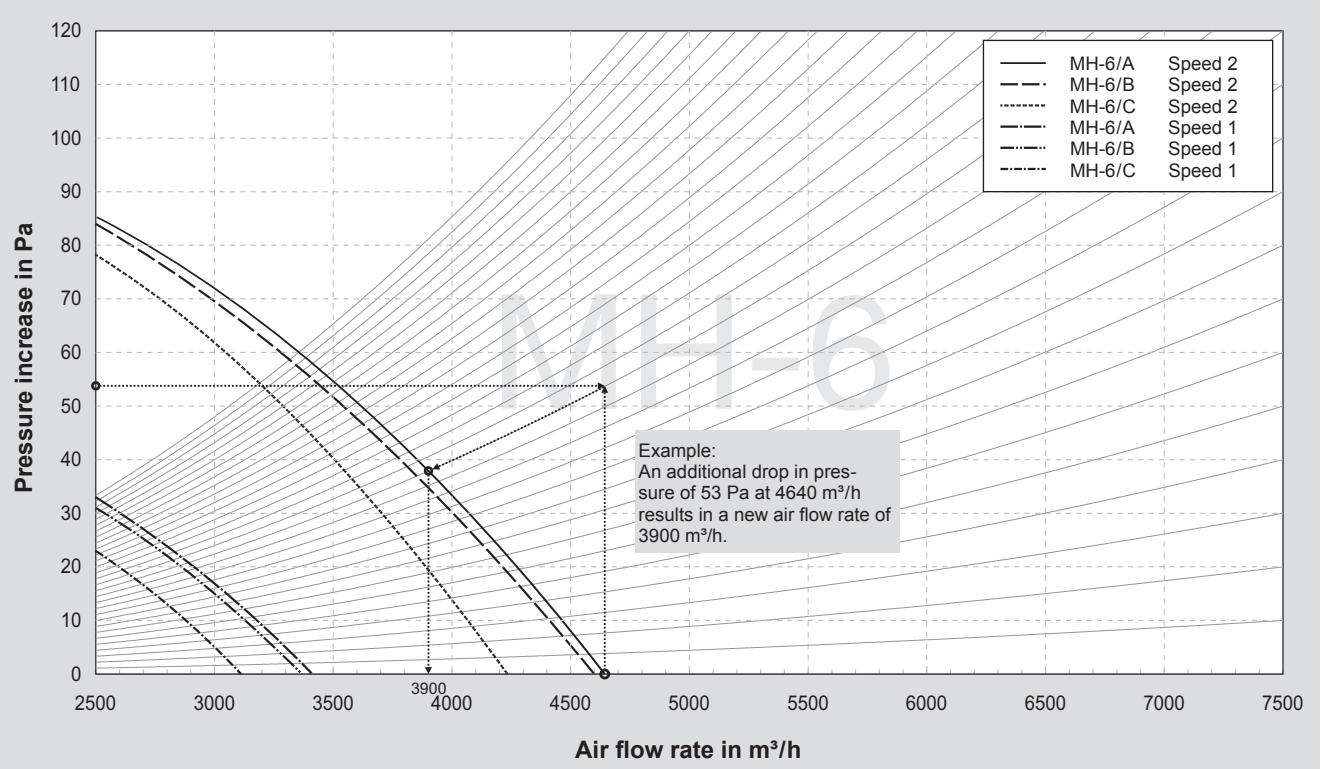


Diagram G1: Air flow rate for TopVent® MH-6 with additional pressure drop

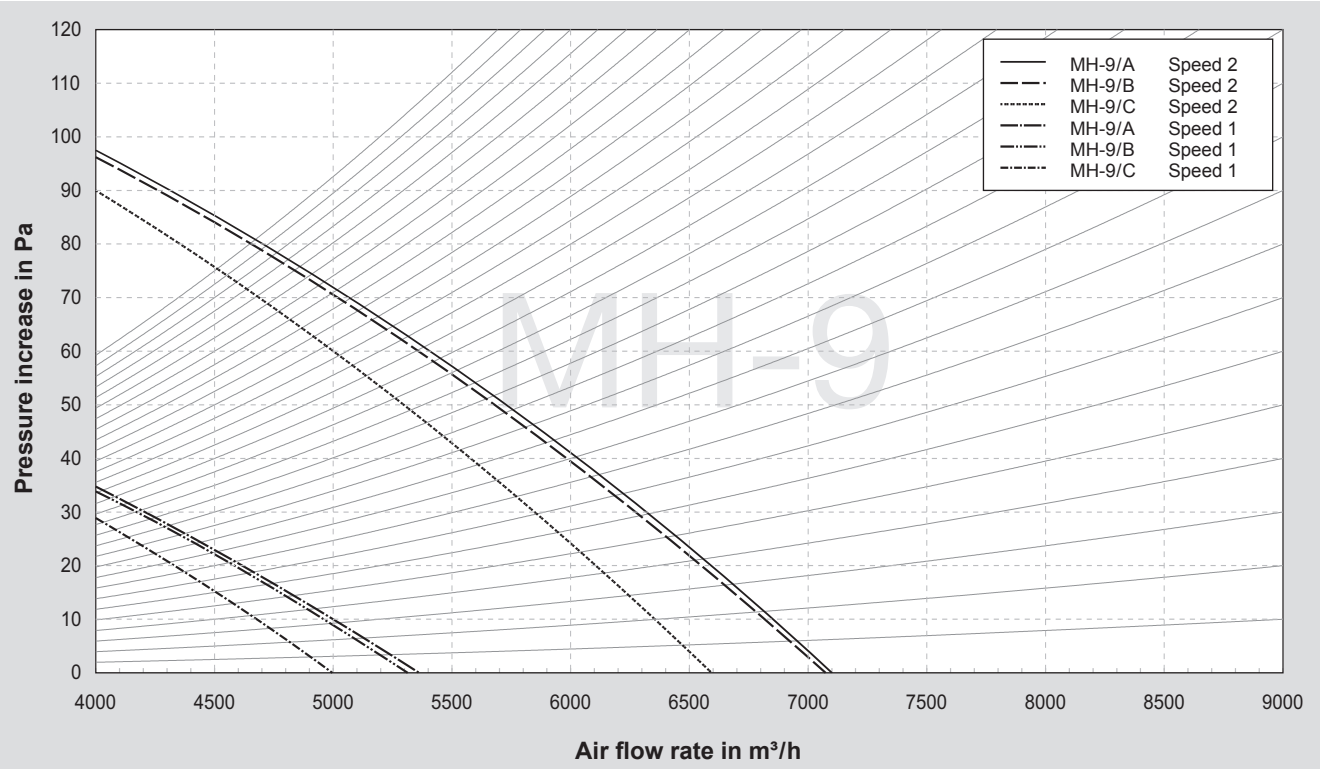


Diagram G2: Air flow rate for TopVent® MH-9 with additional pressure drop

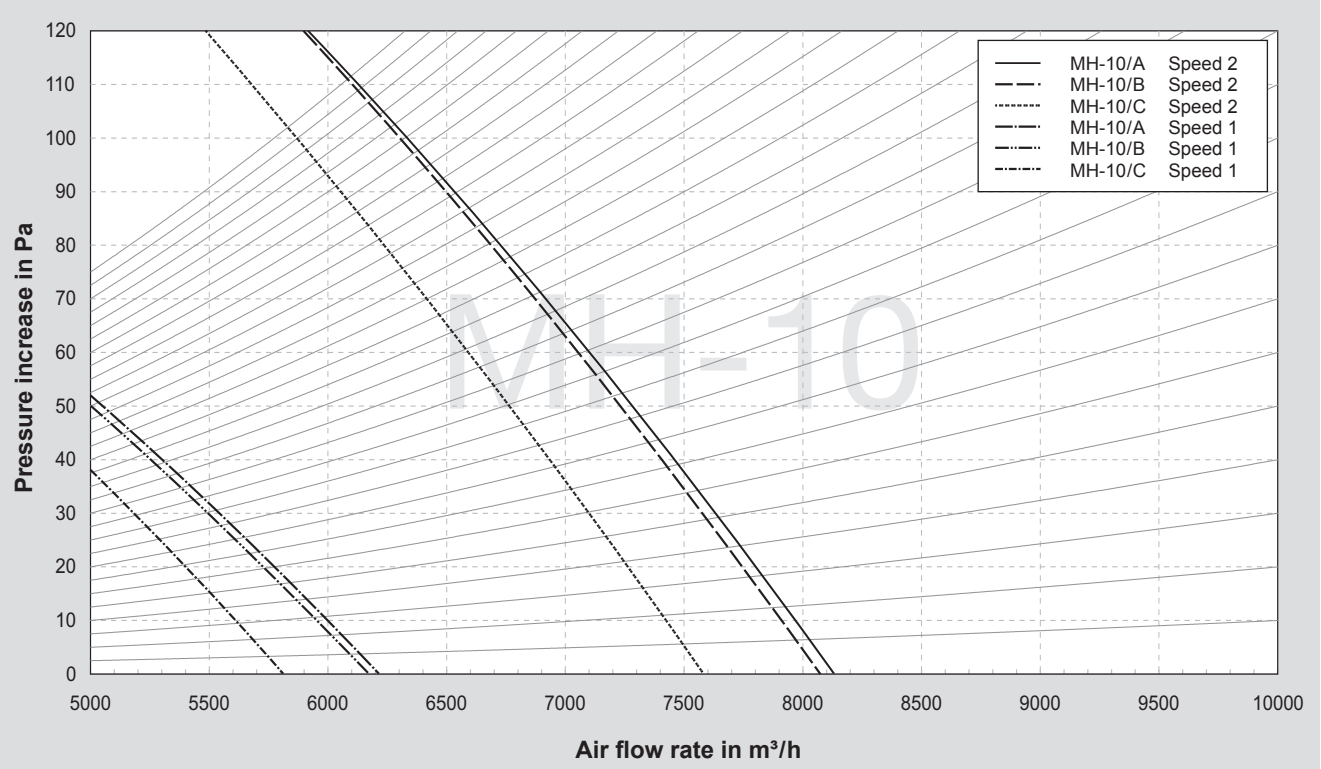


Diagram G3: Air flow rate for TopVent® MH-10 with additional pressure drop

TopVent® MH
Design example

4 Design example

The performance data for the most frequent design conditions are specified in Section 3 'Technical Data'. Use the selection program 'HK-Select' to calculate the performance data for other design data (room temperature, heating medium temperature). You can download 'HK-Select' free of charge on the Internet.

Input data ● Geometry of the room (plan) ● Mounting height (= distance between the floor and lower edge of the TopVent® unit) ● Heat load ● Desired room temperature ● Heating medium temperature (supply/return line) ● Comfort requirements (acoustic) ● Fresh air temperature ● Minimum fresh air flow rate (the fresh air rate can be adjusted from 0 % to 100 %; for energy reasons it has to be limited to a minimum in the design conditions).	**Example** Geometry.....60 x 60 m Mounting height.....8 m Heating load .....265 kW Room temperature.....20 °C Heating medium temperature....80/60 °C Comfort requirements.....Standard Fresh air temperature.....-10 °C Minimum fresh air rate.....20 %
Comfort requirements Define the speed level in accordance with the acoustic requirements: Low noise level → fan speed 1 Normal noise level → fan speed 2	Standard → fan speed 2
Mounting height ● With the minimum mounting height (Table G7) check which units can be used. ● With the maximum mounting height (Table G4) check which units can be used. ● Strike units which are not adequate.	MH-6/A MH-9/A MH-10/A MH-6/B MH-9/B MH-10/B ~~MH-6/C~~ MH-9/C MH-10/C

TopVent® MH
Design example

Minimum number

a) Minimum number based on the area
In table G1 it is specified what maximum floor area can be covered by the TopVent® MH. For a known floor area it is then possible to calculate – for each unit size – the minimum number of units required.

b) Minimum number based on length x width
Depending on the geometry of the hall and in relation to its length and width a certain number of units is required. This can be calculated from maximum distances between the units and between them and the wall (see Table G7).

c) Minimum number based on the heat load
Depending on the total heat output required, a minimum number of units can be calculated for each unit size (see Table G4).

The highest number from results a), b) and c) is the actual minimum number required.

Calculate the minimum number of units according to a), b) and c) and enter it in a table for each type of unit. Take the highest value as the minimum quantity.

Type	a)	b)	c)	
MH-6/A	10	9	9	10
MH-6/B	10	9	7	10
MH-6/C	None			–
MH-9/A	6	9	6	9
MH-9/B	6	9	4	9
MH-9/C	6	9	3	9
MH-10/A	5	9	5	9
MH-10/B	5	9	4	9
MH-10/C	5	9	3	9

Definitive number of units

Choose the final solution from the remaining possibilities, depending on the geometry of the hall and the costs.

9 units of MH-9/A

External air flow rate

From the air flow rate of the selected units (see Table G1) and the required minimum fresh air rate calculate the installed fresh air flow rate.

	9 x 7 100 m³/h
Total fresh air flow rate	63 900 m³/h
Minimum fresh air flow rate	12 780 m³/h

TopVent® MH
Options

5 Options

TopVent® MH units can be adapted to the requirements of a particular project by means of a series of options. You will find a detailed description of all optional components in Section K 'Options' of this handbook.

Paint finish	at no extra cost in the standard Hoval colours red/orange or for an additional charge in any colour required
Suspension set	for mounting the unit on ceiling
Isolation switch	on/off switch that can be operated from the outside
Actuator for Air-Injector	for adjustment of the Air-Injector
Actuator for mixed air box	for adjustment of the fresh air damper and recirculation damper.
Acoustic cowl	to reduce the noise level in the room (reduced noise emission from the Air-Injector)
Insulation	to avoid condensation on the external surfaces of the mixed air box, filter box and Air-Injector.

6 Control systems

For the TopVent® MH units there are components for control of the room temperature and of the air distribution that have been specially developed by Hoval and optimally matched to the devices. You will find a detailed description of these components in Section L 'Control Systems' of this handbook.

6.1 Room temperature control

TempTronic RC	This is a programmable, electronic temperature controller for fully automatic operation. Its control algorithm with fuzzy logic ensures extremely small control deviations and minimizes energy consumption. The TempTronic RC makes it possible to set a fixed fresh air rate.

6.2 Control of the air distribution

Automatic control by the TempTronic RC	The TempTronic RC also controls the air distribution in accordance with the changing operating conditions (i.e. depending on the speed level and on the temperature difference between the supply air and room air).
Manual control by means of a potentiometer	In applications in which the operating conditions only seldom change or when not such high comfort requirements are made, the air distribution can be manually controlled by a potentiometer.
Fixed setting	In cases where the air distribution always takes place under the same conditions (constant supply air temperature, constant air flow rate), it can have a fixed setting.

6.3 Complete system

DigiNet (detailed description on request)	TopVent® MH units are ideally controlled by the DigiNet system. This system, which was developed specially for Hoval indoor climate systems assumes all the control and regulation functions. It regulates the room temperature, controls the air distribution and constantly optimizes the proportion of fresh air (i.e. only as much fresh air as the room temperature permits without additional heating or cooling is blown in).

7 Transport and installation

Transport and assembly work to be carried out only by trained specialists!

A hoist is required for transport and installation of the components! Do not tilt the unit or lay it flat!

7.1 Installation

For ceiling installation the units are equipped as standard with 4 M10 rivet nuts with hexagon head bolts and washers. With these bolts and the height-adjustable suspension set (optional) the unit can be easily fastened to the ceiling.

The rivet nuts are only dimensioned for the unit's own weight. Do not fasten any additional loads!

The rivet nuts cannot take a bending moment; no eyebolts may be used!

Other fastenings with flat bars, perforated bars and angle section, but with steel cables as well, are also possible, however, the following instructions have to be heeded without fail:

- Lateral, inclined suspensions are allowed up to a maximum angle of 45°.
- The unit must be installed horizontally!

A canvas connecting piece is recommended for connection to the fresh air duct.

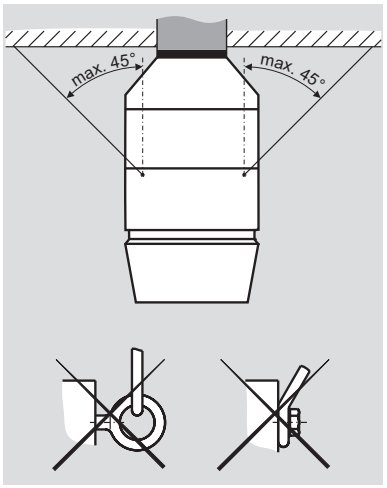


Table G3: Suspension of the TopVent® MH

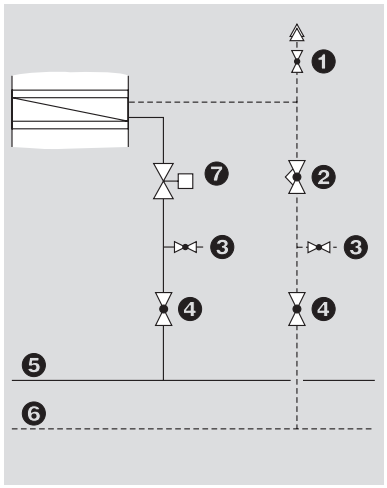
7.2 Hydraulic Installation

Have the hydraulic installation performed by skilled personnel only!

- Combine units that run under the same operating conditions (room temperature, heat gains, operating time etc.) to form a control group.
- Warm or hot water up to a maximum of 120 °C can be used as the heating medium. For energy saving purposes a pre-regulation of the distributor is possible; however, it has to be ensured that the heat requirement of the individual heating coils can be met in any case.
- Connect the heating coils in accordance with Fig. G4. Depending on local circumstances it has to be checked whether compensators for the supply and return lines for compensation of the linear expansion and/or articulated connections are required for the units.

The coil cannot bear any loads, e.g. by means of the flow or return lines!

- Hydraulically balance the individual units with one another so that uniform pressure admission is ensured.



❶	Vent with shut-off device
❷	Flow control valve
❸	Drain cocks
❹	Shut-off valves
❺	Flow
❻	Return
❼	Control valve

Fig. G4: Connection of the heating coil

7.3 Electrical installation

The electrical connection must be performed up to the unit by a certified skilled electrician. The applicable regulations have to be observed (e.g. EN 60204-1).

The unit is supplied ready to operate.

- Check whether the local operating voltage, frequency and fuse protection match the data on the type plate. If there are any discrepancies, the unit must not be connected!
- For long leads the cable cross-sections must be selected according to the technical regulations, e. g. VDE 0100.
- Perform the electrical installation work in accordance with wiring diagram of the control system.
- Connect the TopVent® MH units in accordance with the terminal diagram.

Connect the thermal contacts that are built into the motor. Only then is the motor protected against overheating.

- Do not forget the main switch for the complete system (control system and units).
- Several TopVent® units can be connected by means of a parallel circuit.

Wire the thermal contacts and isolation switch indicator in series!

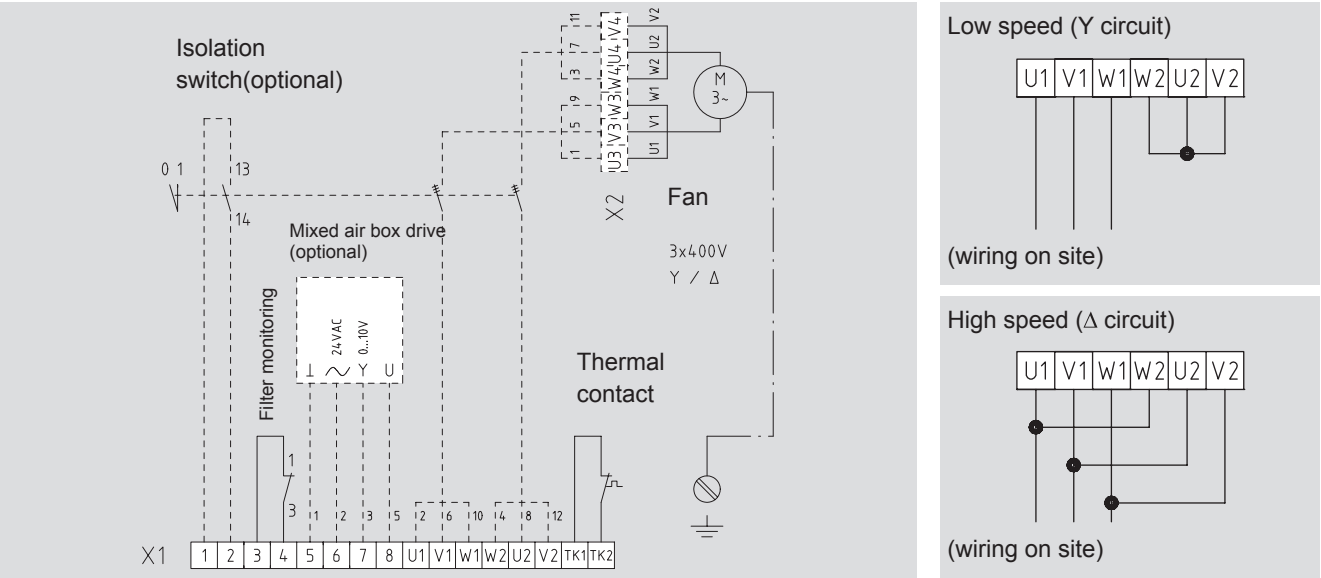


Fig. G5: Terminal diagram for TopVent® MH

TopVent® MH
Specification texts

8 Specification texts

8.1 TopVent® MH
Supply air unit for ventilating and heating high spaces

Housing made of non-corrosive Aluzinc sheet metal, standard equipment with 4 riveting nuts 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 a 2-speed, 3-phase external rotor motor with pressure-resistant aluminium sickle-shaped blades, maintenance-free and quiet, with a high degree of efficiency. Motor protection through built-in thermal contacts. Protection class IP54.
Filter box with 2 bag filters class G4, including filter monitoring with a differential pressure control device.
Mixed air box made of non-corrosive Aluzinc sheet metal with outside air and recirculating air covers coupled in the opposite direction.
Terminal box integrated on the side inside of the housing to connect supply voltage and accessories.
Vortex air distributor with a concentric outlet nozzle, 12 adjustable guide vanes, sound attenutation cowl and supply air temperature sensor.

Technical data

Fan speed	1	2	
Nominal air flow rate	_____	_____	m³/h
Floor area reached	_____	_____	m²
Mounting height	_____	_____	m
Nominal heating output	_____	_____	kW
with LPHW	_____	_____	°C
and air inlet temperature	_____	_____	°C
Power consumption	_____	_____	kW
Current consumption	_____	_____	A
Voltage	400 V / 50 Hz		

MH-6/A	MH-6/B	MH-6/C
MH-9/A	MH-9/B	MH-9/C
MH-10/A	MH-10/B	MH-10/C

8.2 Options

■ Standard paint finish SL
in the Hoval colours red (RAL 3000) and orange (RAL 2008)

■ Paint finish as desired
in RAL colour No. _____

■ Suspension set AHS
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.

■ Isolation switch RS
in the terminal box of the TopVent® unit

■ Actuator for Air-Injector VT-AS
with cable and plug for adjustment of the Air-Injector

■ Actuator for mixed air box MLK-A
with cable for adjustment of the fresh air damper and recirculation damper.

■ Acoustic cowl AHD
consisting of a sound attenuation cowl of large volume and a screen with a lining of sound attenuation material, insertion attenuation 4 dB(A)

■ Insulation
- of the Air-Injector
- of the filter box
- of the mixed air box

8.3 Control systems

■ Room temperature control and automatic control of the air distribution using the TempTronic RC

Programmable regulation system with menu-guided operator control for fully-automatic operation of the TopVent® units:

- TempTronic RC, operator control terminal as a wall unit in a plastic housing with an integrated room temperature sensor
- RC station RCS for the power supply and control of several TopVent® units in parallel operation
- RC single station RCE for the power supply and control of a single TopVent® unit
- Actuator VT-AS for automatic adjustment of the air blow-out direction from vertical to horizontal
- Optional module OM for the control of additional functions, as a wall unit in a plastic housing
- Room temperature sensor RF for the connection in place of the room temperature sensor that is integrated into the TempTronic RC, in a plastic housing for wall-mounted installation
- Room temperature mean value MRT4, 4 room temperature sensors for installation in the occupied area

■ Manual control of the air distribution by means of the potentiometer

Manual control by means of potentiometer and actuator for adjustment of the air blow-out direction from vertical to horizontal:

- Potentiometer wall unit PMS-W
- Potentiometer for installation into a control panel PMS-S
- Actuator VT-AS
- Transformer TA for a maximum of 7 actuators

TopVent® MK

Supply air unit for ventilating, heating and cooling high spaces

TopVent® MK
Use

1 Use

1.1 Intended use
The TopVent® MK unit is used to ventilate, heat and cool large spaces with a variable fresh air supply.
Proper use also includes observance of the mounting, commissioning, operating, and servicing conditions (operating instructions) specified by the manufacturer as well as the consideration of foreseeable abnormal behaviour and residual dangers.

1.2 User group
TopVent® MK units may only be installed, operated and maintained by authorized and trained skilled personnel. The operating instructions are for English-speaking operating engineers and technicians as well as specialists in building, heating and air technology.

1.3 Operating Modes
TopVent® MK units have the following operating modes:
- Fresh air, mixed air or recirculation mode with low fan speed (0... 100 % fresh air)
- Fresh air, mixed air or recirculation mode with high fan speed (0... 100 % fresh air)
- Standby
- Off

The application limits specified in the Section 'Technical Data' must be complied with.
Any other or any additional use counts as improper. The manufacturer shall not be responsible for any damages that may result thereby.

The units are not suitable for operation in explosion-prone areas, in wet rooms or in rooms with a high dust incidence.

1.4 Residual dangers
Despite all of the precautionary measures taken, there are residual dangers; these are potential, non-apparent dangers, such as:
- Danger when working on the electrical system.
- When working on the TopVent® unit, parts (e.g. tools) can be dropped.
- Malfunctions due to defective parts
- Danger from hot water when working on the hot water supply.

2 Construction and operation

The TopVent® MK unit is used to ventilate, heat and cool in fresh air, mixed air or recirculation mode; it was developed specially for use in high halls. The unit is installed under the ceiling and connected to a fresh air duct. Depending on the position of the dampers it draws in fresh air and/or indoor air, heats or cools it and blows it into the room through the Air-Injector.
Thanks to its high performance and efficient air distribution the TopVent® MK covers a large area. Therefore, compared to other systems, fewer units are needed to achieve the required conditions.
2 unit sizes, 2-speed fans, various coil types and a series of accessories make it possible to provide a customized solution for any hall-type building.

2.1 Unit construction
The TopVent® MK consists of the following components:
- Mixed air box (with fresh air and recirculation air dampers linked to move in opposite directions)
- Filter box (with 2 class G4 bag filters)
- Heating/cooling section (with fan, heat exchanger and integrated condensate separator for the condensate incurred)
- Automatically adjustable vortex air distributor, Air-Injector

The heating/cooling section is insulated to avoid condensation on the external surfaces. The components are bolted together, but can be dismantled separately again.

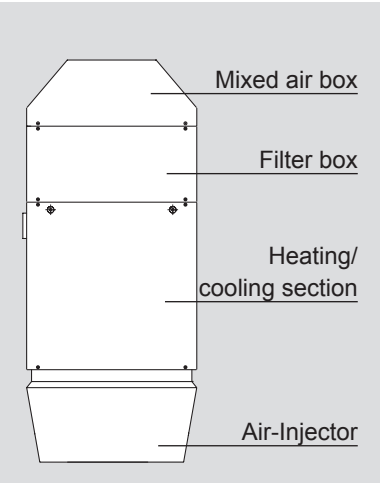
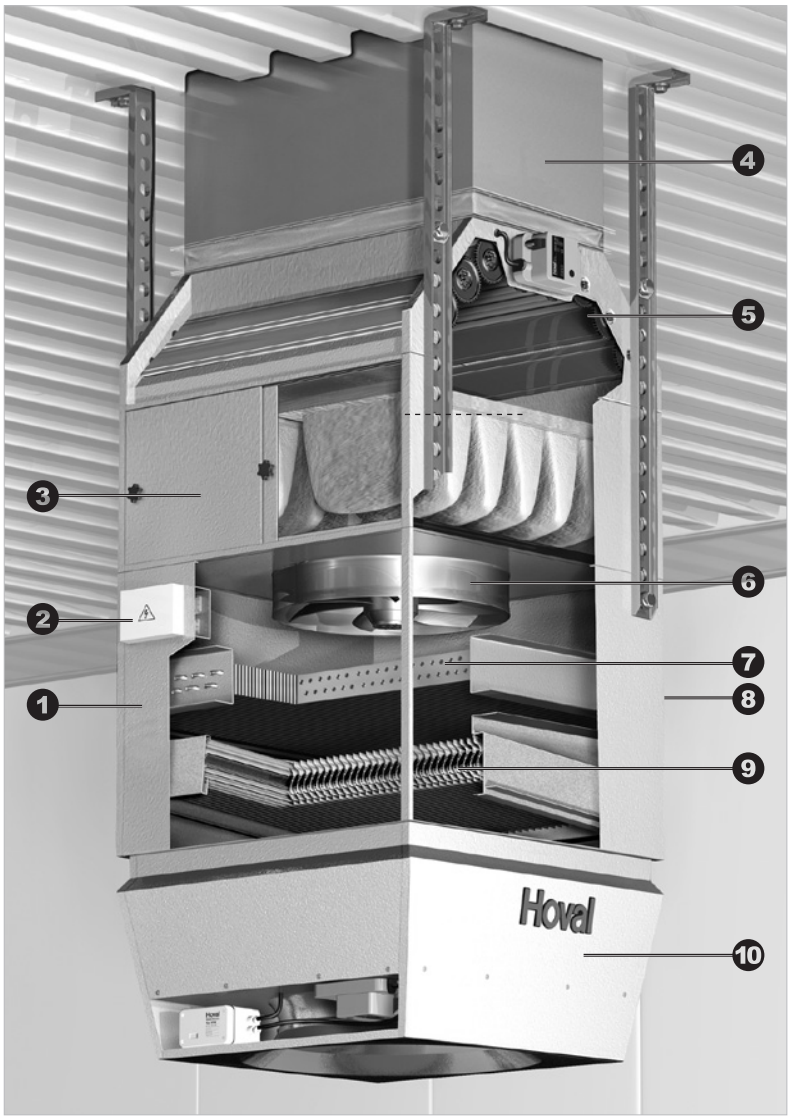


Fig. H1: Components of the TopVent® MK



❶	Housing: made of corrosion-resistant Aluzinc sheet metal; the heating/cooling section is insulated
❷	Terminal box
❸	Filter box easily accessible behind the sliding door, with 2 class G4 bag filters and a differential pressure control device for filter monitoring
❹	Fresh air duct with canvas connection (not included in Hoval delivery specifications)
❺	Mixed air box: with fresh air and recirculation air dampers made of extruded aluminium profile section and plastic gearwheels
❻	Fan maintenance-free, low-noise sickle fan with a low energy consumption
❼	Heat exchanger: LPHW/LPCW coil consisting of copper tubes with aluminium fins
❽	Frost protection thermostat: installed in the heat exchanger
❾	Condensate separator: with condensate connection
❿	Air-Injector: patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area

Fig. H2: Construction of the TopVent® MK

H

2.2 Air distribution by means of the Air-Injector

The patented air distributor – called the Air-Injector – is the core element. The discharge angle of the air is set using the adjustable vanes. It depends on the air flow rate (→ fan speed), the mounting height and the temperature difference between the supply air and indoor air. The air is therefore blown vertically downwards, conically or horizontally into the room. This ensures that

- with each TopVent® MK unit a large area of the hall is heated,
- the occupied area is draught-free,
- the temperature stratification in the room is reduced, thus saving energy.

TopVent® MK
Technical data

3 Technical data

Unit type		MK-6/C		MK-9/C		MK-9/D	
Fan speed		**1**	**2**	**1**	**2**	**1**	**2**
Rotational speed (nominal)	min^{-1}	680	900	660	860	660	860
Nominal air flow rate [1]	m³/h	3300	4100	5600	7400	5400	7100
Max. floor area reached [2]	m²	267	337	491	714	469	674
Power consumption (at 400 V / 50 Hz)	kW	0.70	0.98	1.00	1.65	1.00	1.65
Current consumption (at 400 V / 50 Hz)	A	1.15	1.75	1.80	3.50	1.80	3.50

[1] Please consider the additional pressure drop of the fresh air duct
[2] Mounting height H_{max} = 11 m with a temperature difference between supply air and room air of up to 30 K

Table H1: Technical data of the TopVent® MK

Type designation code

MK – 6 / C

Unit type
TopVent® MK

Unit size
6 or 9

Heat exchanger
Coil type C or D

Table H2: Type designation code

Unit type			MK-6		MK-9	
Fan speed			**1**	**2**	**1**	**2**
Sound pressure level (at a distance of 5 m) [1]		dB(A)	50	56	59	66
Total sound power level		dB(A)	72	78	81	88
Octave sound power level	63 Hz	dB	77	81	92	97
	125 Hz	dB	72	81	85	92
	250 Hz	dB	72	77	85	92
	500 Hz	dB	66	72	78	85
	1000 Hz	dB	68	73	75	82
	2000 Hz	dB	66	73	69	76
	4000 Hz	dB	60	66	62	70
	8000 Hz	dB	53	60	53	61

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

Table H3: Sound power values of the TopVent® MK

Air inlet temperature [1]				15 °C					20 °C				
Size	LPHW °C	Type	St.	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h	Q kW	H_{max} m	Δp_W kPa	t_S °C	m_W l/h
MK-6	80/60	C	1	53	5.5	6	57	2276	49	5.8	5	58	2114
			2	63	6.7	8	55	2694	58	7.1	7	56	2502
	60/40	C	1	33	6.8	3	40	1428	29	7.5	2	40	1265
			2	39	8.5	4	38	1685	35	9.3	3	39	1491
MK-9	80/60	C	1	88	6.5	6	56	3780	82	6.9	5	57	3511
			2	109	8.5	9	53	4672	101	9.0	8	54	4339
		D	1	– [2]	–	–	–	–	–	–	–	–	–
			2	–	–	–	–	–	–	–	–	–	–
	60/40	C	1	55	8.2	3	39	2367	49	9.0	2	40	2095
			2	68	10.9	4	37	2914	60	12.0	3	38	2578
		D	1	63	7.3	3	44	2715	56	7.9	2	45	2410
			2	80	9.4	4	43	3422	71	10.3	3	43	3035

[1] The air inlet temperatures (15 or 20 °C) are equal to the indoor air temperature. The quoted heating outputs relate to a fresh air rate of 20 % (at -10 °C); i.e. the mixed air temperatures before the heating coil are 10 or 14 °C.

[2] These operating conditions are not permissible, because the maximum supply air temperature of 60 °C is exceeded.

Legend:
Type = Type of heating/cooling coil
St. = Speed level
Q = Heating output
H_{max} = Max. mounting height
Δp_W = Water pressure drop
t_S = Supply air temperature
m_W = Water flow rate

Table H4: Heating outputs of the TopVent® MK

TopVent® MK
Technical data

Cooling medium temperature				6/12 °C						8/14 °C					
Type	t_{AI} [1] °C	rh %	St.	Q_{sen} kW	Q_{tot} kW	Δp_W kPa	t_S °C	m_W l/h	m_C kg/h	Q_{sen} kW	Q_{tot} kW	Δp_W kPa	t_S °C	m_W l/h	m_C kg/h
MK-6/C	24	50	1	15	20	11	14	2813	7	13	15	7	15	2157	3
			2	17	23	15	14	3260	8	15	17	9	16	2487	3
		70	1	14	30	24	14	4242	22	12	25	17	16	3584	18
			2	17	34	31	15	4926	25	14	29	23	16	4152	21
	28	50	1	18	28	21	14	3965	15	16	23	15	16	3309	11
			2	21	32	28	15	4603	16	19	27	20	17	3832	12
		70	1	17	40	41	15	5703	32	15	35	32	16	5032	28
			2	20	46	53	16	6627	38	18	41	42	17	5836	33
MK-9/C	24	50	1	24	32	11	14	4619	12	21	25	7	16	3530	5
			2	30	39	16	15	5549	13	26	29	9	16	4214	5
		70	1	23	49	24	14	6978	36	20	41	17	16	5887	29
			2	28	59	33	15	8400	43	25	49	24	17	7066	35
	28	50	1	29	46	21	15	6521	24	26	38	15	16	5433	17
			2	36	55	29	16	7850	27	32	46	21	17	6519	19
		70	1	28	66	40	15	9389	53	25	58	32	17	8276	46
			2	34	79	56	17	11310	64	30	69	44	18	9944	55
MK-9/D	24	50	1	28	40	12	12	5666	17	24	31	8	13	4428	9
			2	35	49	18	12	7029	20	31	38	12	14	5465	11
		70	1	28	59	25	12	8423	44	24	50	19	14	7191	37
			2	35	73	38	12	10487	55	30	62	28	14	8922	46
	28	50	1	34	55	23	12	7885	31	30	46	16	14	6654	23
			2	42	69	33	13	9815	37	38	58	24	14	8251	28
		70	1	33	78	43	12	11232	64	30	70	34	14	9991	57
			2	42	98	63	13	14016	80	37	87	51	15	12431	70

[1] The inlet air temperatures (24 or 28 °C) are equal to the room air temperature. The quoted cooling capacities relate to a fresh air rate of 20 % (at +32 °C); i.e. the mixed air temperatures before the heating coil are 25.6 or 28.8 °C.

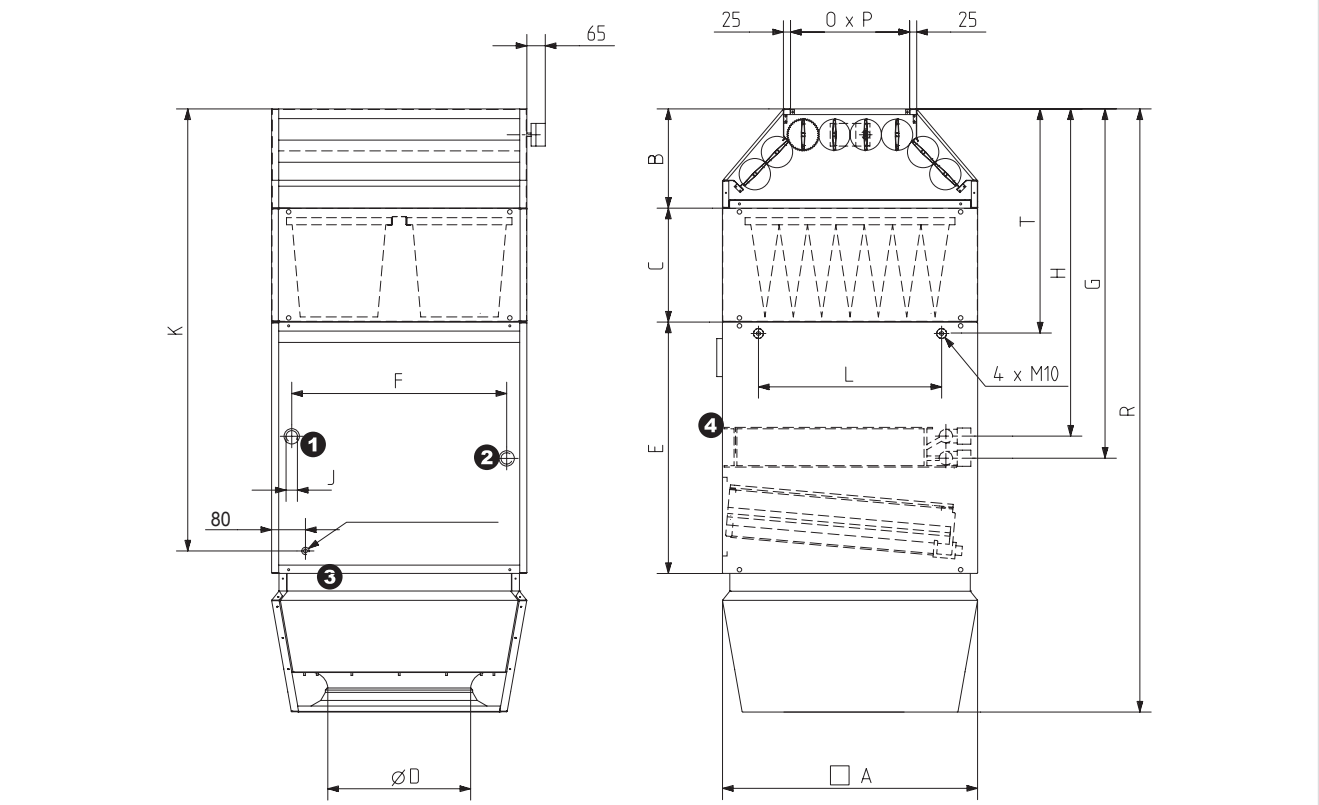
Legend:

Type	= Unit type	Q_{tot}	= Total cooling capacity
t_{AI}	= Air inlet temperature	Δp_W	= Water pressure drop
rh	= Air inlet humidity	t_S	= Supply air temperature
St.	= Speed level	m_W	= Water flow rate
Q_{sen}	= Sensitive cooling capacity	m_C	= Amount of condensate

Table H5: Cooling capacities of the TopVent® MK

Max. operating pressure	800	kPa
Maximum heating medium temperature	120	°C
Maximum supply air temperature	60	°C
Maximum ambient temperature	40	°C
Maximum amount of condensate MK-6	60	kg/h
Maximum amount of condensate MK-9	150	kg/h
Minimum air flow rate MK-6	3100	m³/h
Minimum air flow rate MK-9	5000	m³/h

Table H6: Application limits of the TopVent® MK

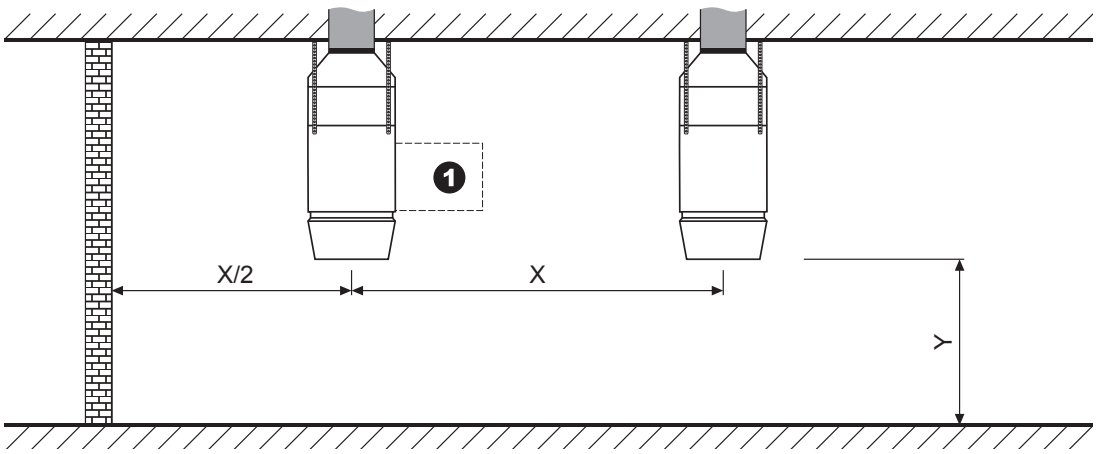


Unit type		MK-6/C	MK-9/C	MK-9/D
A	mm	900	1100	1100
B	mm	355	360	360
C	mm	400	400	400
Ø D	mm	500	630	630
E	mm	890	930	930
F	mm	758	882	882
G	mm	1225	1250	1259
H	mm	1147	1172	1164
J	"	1¼ (BSP female)	1½ (BSP female)	2 (BSP female)
K	mm	1591	1637	1637
L	mm	594	846	846
M	"	1 (male)	1 (male)	1 (male)
O x P	mm	420 x 850	500 x 1050	500 x 1050
R	mm	2135	2260	2260
T	mm	795	800	800
Weight	kg	220	280	300
Water content of the coil	l	6.2	9.4	14.2

❶	Return
❷	Flow
❸	Condensate drain connection
❹	Access panels

Table H7: Dimensions and weights of the TopVent® MK

TopVent® MK
Technical data



Unit type			MK-6/C		MK-9/C		MK-9/D	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Unit clearance X	min.	m	9	10	11	13	11	13
	max.	m	16	18	22	27	22	26
Mounting height Y	min.	m	4	4	5	5	5	5

❶ For service and maintenance provide a clear space of about 1.5 m on the rear side of the coil connections.

Table H8: Minimum and maximum distances

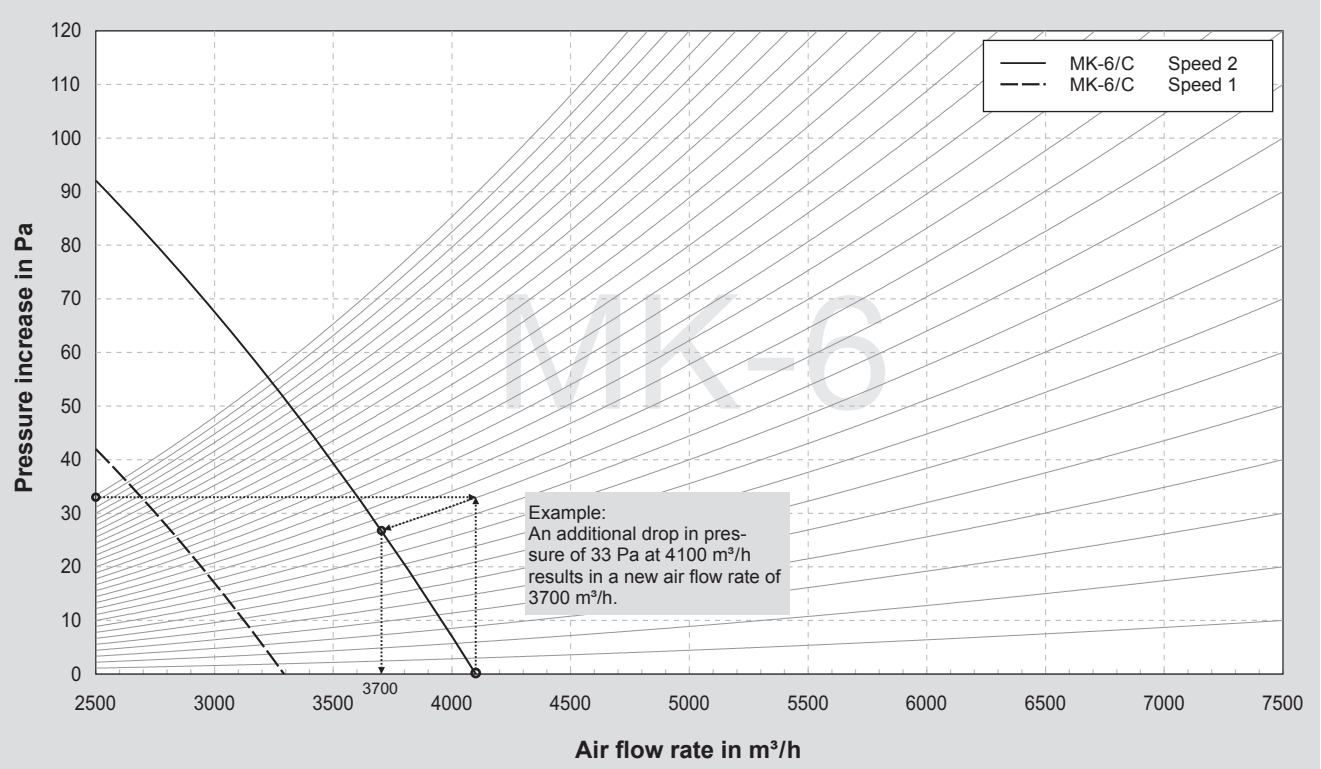


Diagram H1: Air flow rate for TopVent® MK-6 with additional pressure drop

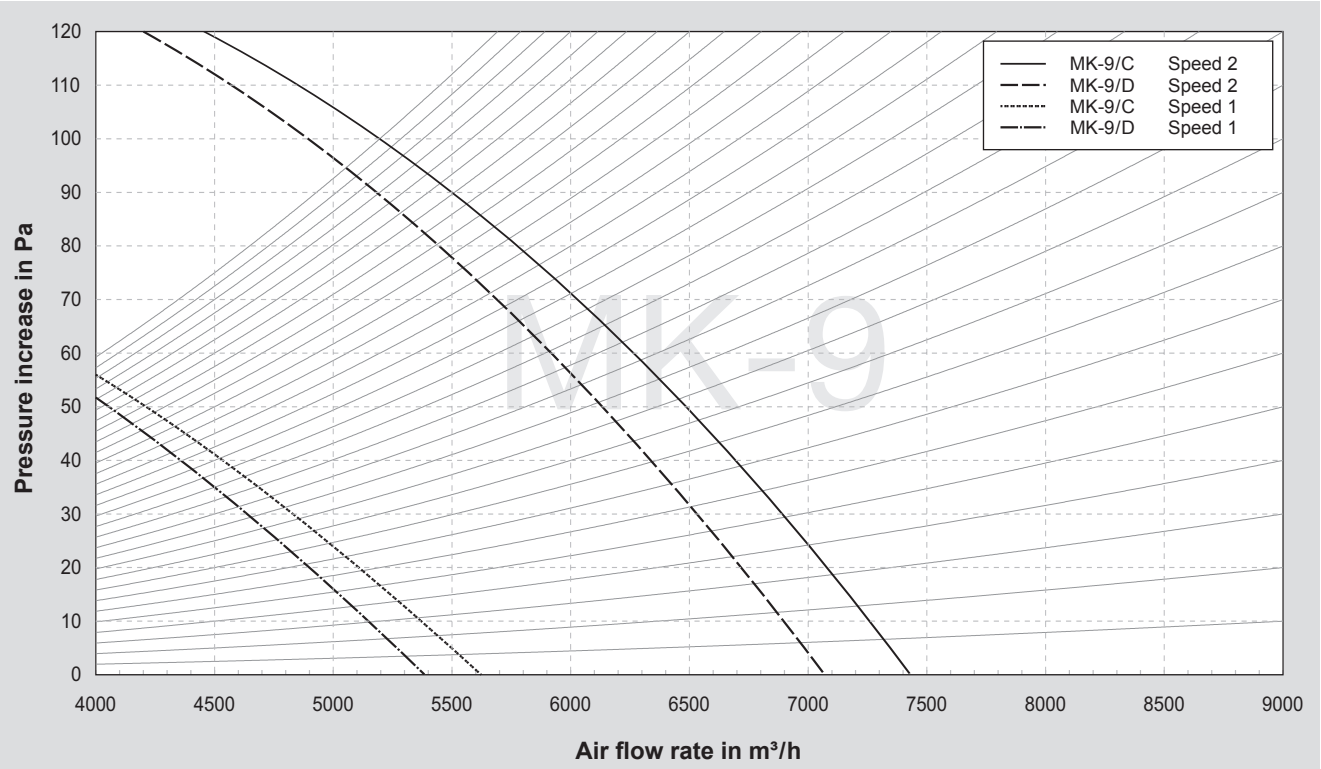


Diagram H2: Air flow rate for TopVent® MK-9 with additional pressure drop

TopVent® MK
Design example

4 Design example

The performance data for the most frequent design conditions are specified in Section 3 'Technical Data'. Use the selection program 'HK-Select' to calculate the performance data for other design data (room temperature, cooling medium temperature). You can download 'HK-Select' free of charge on the Internet.

The following design rating example relates to cooling mode. The design rating for heating mode can be performed analogously to the design rating example in Section G 'TopVent® MH'.

Input data ● Geometry of the room (plan) ● Mounting height (= distance between the floor and lower edge of the TopVent® unit) ● Cooling load ● Desired room conditions ● Cooling medium temperature (supply/return line) ● Comfort requirements (acoustic) ● Fresh air temperature ● Minimum fresh air rate (the fresh air rate can be adjusted from 0 % to 100 %; for energy reasons it has to be limited to a minimum in the design conditions).	**Example** Geometry.....40 x 62 m Mounting height.....6.5 m Cooling load.....140 kW Room conditions.....24 °C / 50 % Cooling medium temperature ....8/14 °C Comfort requirements.....Standard Fresh air temperature.....32 °C Minimum fresh air rate.....20 %
Comfort requirements Define the fan speed in accordance with the acoustic requirements: Low noise level → fan speed 1 Normal noise level → fan speed 2	Standard → fan speed 2
Mounting height ● With the minimum mounting height (Table H8) check which units can be used. ● Strike units which are not adequate.	MK-6/C ✓ MK-9/C ✓ MK-9/D ✓

TopVent® MK
Design example

Minimum number

a) Minimum number based on the area
In table H1 it is specified what maximum floor area can be covered by the TopVent® DKV. For a known floor area it is then possible to calculate – for each unit size – the minimum number of units required.

b) Minimum number based on length x width
Depending on the geometry of the hall and in relation to its length and width a certain number of units is required. This can be calculated from maximum distances between the units and between them and the wall (see Table H8).

c) Minimum number based on the cooling load
Depending on the total cooling capacity required the minimum number of units can be calculated for each unit size (see Table H5).

The highest number from results a), b) and c) is the actual minimum number required.

Calculate the minimum number of units according to a), b) and c) and enter it in a table for each type of unit. Take the highest value as the minimum quantity.

Type	a)	b)	c)	
MK-6/C	8	12	10	12
MK-9/C	4	6	6	6
MK-9/D	4	6	5	6

Definitive number of units

Choose the final solution from the remaining possibilities, depending on the geometry of the hall and the costs.

6 units of MK-9/C

External air flow rate

From the air flow rate of the selected units (see Table H1) and the required minimum fresh air rate calculate the installed fresh air flow rate.

	6 x 7400 m³/h
Total fresh air flow rate	44400 m³/h
Minimum fresh air flow rate	8880 m³/h

TopVent® MK
Options

5 Options

TopVent® MK units can be adapted to the requirements of a particular project by means of a series of options. You will find a detailed description of all optional components in Section K 'Options' of this handbook.

Paint finish	at no extra cost in the standard Hoval colours red/orange or for an additional charge in any colour required
Suspension set	for mounting the unit on ceiling
Isolation switch	on/off switch that can be operated from the outside
Actuator for Air-Injector	for adjustment of the Air-Injector
Actuator for mixed air box	for adjustment of the fresh air damper and recirculation damper
Acoustic cowl	to reduce the noise level in the room (reduced noise emission from the Air-Injector)
Insulation	to avoid condensation on the external surfaces of the Air-Injector
Condensate pump	for condensate drainage through waste water pipes directly below the ceiling or onto the roof

6 Control systems

For the TopVent® MK there are components for control of the room temperature and of the air distribution that have been specially developed by Hoval and optimally matched to the units. You will find a detailed description of these components in Section L 'Control Systems' of this handbook.

6.1 Room temperature control

TempTronic RC	This is a programmable, electronic temperature controller for fully automatic operation. Its control algorithm with fuzzy logic ensures extremely small control deviations and minimizes energy consumption. The TempTronic RC makes it possible to set a fixed fresh air rate.

6.2 Control of the air distribution

Automatic control by the TempTronic RC	The TempTronic RC also controls the air distribution in accordance with changing operating conditions (i.e. depending on the speed level and on the temperature difference between the supply air and room air).
Manual control by means of a potentiometer	In applications in which the operating conditions only seldom change or when not such high comfort requirements are made, the air distribution can be manually controlled by a potentiometer.
Fixed setting	In cases where the air distribution always takes place under the same conditions (constant supply air temperature, constant air flow rate), it can have a fixed setting.

6.3 Complete system

DigiNet (detailed description on request)	TopVent® MH units are ideally controlled by the DigiNet system. This system, which was developed specially for Hoval indoor climate systems assumes all the control and regulation functions. It regulates the room temperature, controls the air distribution and constantly optimizes the proportion of fresh air (i.e. only as much fresh air is blown in as the room temperature permits without additional heating or cooling).

TopVent® MK
Transport and installation

7 Transport and installation

Transport and assembly work to be carried out only by trained specialists!

A hoist is required for transport and installation of the components! Do not tilt the unit or lay it flat!

7.1 Installation

For ceiling installation the units are equipped as standard with 4 M10 rivet nuts with hexagon head bolts and washers. With these bolts and the height-adjustable suspension set (optional) the unit can be easily fastened to the ceiling.

The rivet nuts are only dimensioned for the unit's own weight. Do not fasten any additional loads!

The rivet nuts cannot take a bending moment; no eyebolts may be used!

Other fastenings with flat bars, perforated bars and angle section, but with steel cables as well, are also possible, however, the following instructions have to be heeded without fail:

- Lateral, inclined suspensions are allowed up to a maximum angle of 45°.
- The unit must be installed horizontally!

A canvas connecting piece is recommended for connection to the fresh air duct.

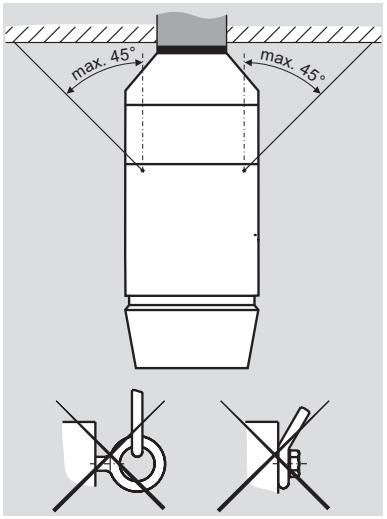


Fig. H3: Suspension of the TopVent® MK

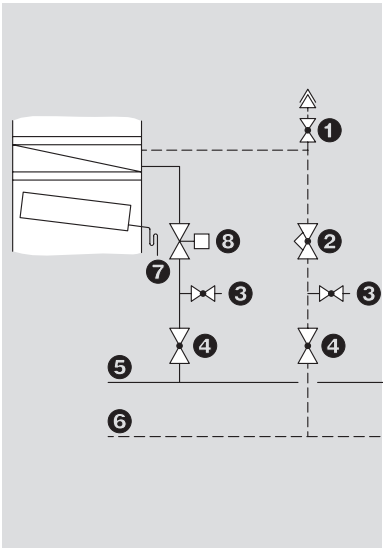
7.2 Hydraulic Installation

Have the hydraulic installation performed by skilled personnel only!

- Combine units that run under the same operating conditions (room temperature, heat gains, operating time etc.) to form a control group.
- Warm or hot water up to a maximum of 120 °C can be used as the heating medium. For energy saving purposes a pre-regulation of the distributor is possible; however, it has to be ensured that the heat requirement of the individual heating coils can be met in any case.
- Connect the heating/cooling coils in accordance with Fig. H4. Depending on local circumstances it has to be checked whether compensators for the supply and return lines for compensation of the linear expansion and/or articulated connections are required for the units.

The coil cannot bear any loads, e.g. by means of the flow or return lines!

- Dimension the slopes and cross-section of the condensate drainage line so that no condensate backflow takes place.
- Hydraulically balance the individual units with one another so that uniform pressure admission is ensured.



1	Vent with shut-off device
2	Flow control valve
3	Drain cocks
4	Shut-off valves
5	Flow
6	Return
7	Condensate drain (with odour trap)
8	Control valve

Fig. H4: Connection of the heating/cooling coil

7.3 Electrical installation

The electrical connection must be performed up to the unit by a certified skilled electrician. The applicable regulations have to be observed (e.g. EN 60204-1).

The unit is supplied ready to operate.

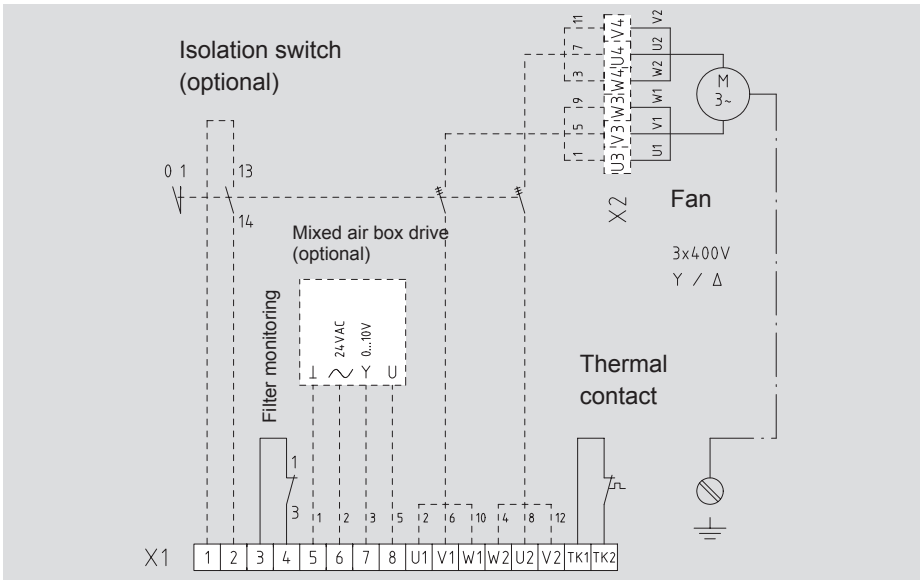
- Check whether the local operating voltage, frequency and fuse protection match the data on the type plate. If there are any discrepancies, the unit must not be connected!
- For long leads the cable cross-sections must be selected according to the technical regulations, e. g. VDE 0100.
- Perform the electrical installation work in accordance with the wiring diagram of the control system.
- Connect the TopVent® MK units in accordance with the terminal diagram.

Connect the thermal contacts that are built into the motor. Only then is the motor protected against overheating.

- Do not forget the main switch for the complete system (control system and units).
- Several TopVent® units can be connected by means of a parallel circuit.

Wire the thermal contacts and isolation switch indicator in series!

- The condensate separator only functions while the fan is running. So switch off the coolant pump together with the fans.



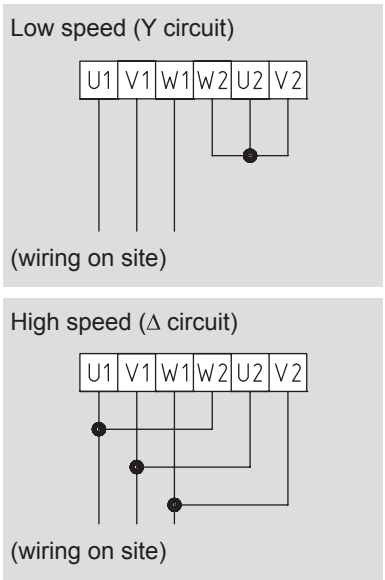


Fig. G5: Terminal diagram for TopVent® MH

TopVent® MK
Specification texts

8 Specification texts

8.1 TopVent® MK
Supply air unit for ventilating, heating and cooling high spaces

Housing made of non-corrosive Aluzinc sheet metal, heating/cooling section insulated on the inside, equipped as standard with 4 rivet nuts size M10 with hexagon head bolts and washers for ceiling installation.
Heat exchanger made of copper tubes and aluminium fins, manifolds and distributor made of steel, integrated condensate separator with condensate connection.
Fan unit consisting of a 2-speed, 3-phase external rotor motor with pressure-resistant aluminium sickle-shaped blades, maintenance-free and quiet, with a high degree of efficiency. Motor protection through built-in thermal contacts. Protection class IP54.
Filter box with 2 bag filters class G4, including filter monitoring with a differential pressure control device.
Mixed air box made of non-corrosive Aluzinc sheet metal with fresh air damper and recirculation damper coupled in the opposite direction.
Terminal box integrated on the side inside of the housing to connect supply voltage and accessories.
Vortex air distributor with a concentric outlet nozzle, 12 adjustable guide vanes, sound attenuation cowl and supply air temperature sensor.

Technical data

Fan speed	1	2	
Nominal air flow rate	_____	_____	m³/h
Floor area reached	_____	_____	m²
Mounting height	_____	_____	m
Nominal heating output	_____	_____	kW
with LPHW	_____	_____	°C
and air inlet temperature	_____	_____	°C
Nominal cooling capacity	_____	_____	kW
with LPCW	_____	_____	°C
air inlet temperature	_____	_____	°C
and air inlet humidity	_____	_____	%
Power consumption	_____	_____	kW
Current consumption	_____	_____	A
Voltage	400 V / 50 Hz		

MK-6/C
MK-9/C
MK-9/D

8.2 Options

■ Standard paint finish SL
in the Hoval colours red (RAL 3000) and orange (RAL 2008)

■ Paint finish as desired
in RAL colour No. _____

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

■ Isolation switch RS
in the terminal box of the TopVent® unit

■ Actuator for Air-Injector VT-AS
with cable and plug for adjustment of the Air-Injector

■ Actuator for mixed air box MLK-A
with cable for adjustment of the fresh air damper and recirculation damper.

■ Acoustic cowl AHD
consisting of a sound attenuation cowl of large volume and a screen with a lining of sound attenuation material, insertion attenuation 4 dB(A)

■ Insulation ID
- of the Air-Injector
- of the filter box
- of the mixed air box

■ Condensate pump KP
consisting of a centrifugal pump, a drip tray and a plastic hose, max. delivery rate of 150 l/h with a delivery head of 3 m.

8.3 Control systems

■ Room temperature control and automatic control of the air distribution by the TempTronic RC
Programmable regulation system with menu-guided operator control for fully-automatic operation of the TopVent® units:

- TempTronic RC, operator control terminal as a wall unit in a plastic housing with an integrated room temperature sensor
- RC station RCS for the power supply and control of several TopVent® units in parallel operation
- RC single station RCE for the power supply and control of a single TopVent® unit
- Actuator VT-AS for automatic adjustment of the air blow-out direction from vertical to horizontal
- Optional module OM for the control of additional functions, as a wall unit in a plastic housing
- Room temperature sensor RF for the connection in place of the room temperature sensor that is integrated into the TempTronic RC, in a plastic housing for wall-mounted installation
- Room temperature mean value MRT4, 4 room temperature sensors for installation in the occupied area

■ Manual control of the air distribution by means of the potentiometer
Manual control by means of potentiometer and actuator for adjustment of the air blow-out direction from vertical to horizontal:

- Potentiometer wall unit PMS-W
- Potentiometer for installation into a control panel PMS-S
- Actuator VT-AS
- Transformer TA for a maximum of 7 actuators

TopVent® HV

Recirculation unit heater for rooms with up to 6 m height

TopVent® HV
Use

1 Use

1.1 Intended use
The TopVent® HV unit is used to heat rooms with a height of up to 6 m in recirculation mode.
Proper use also includes observance of the installation, commissioning, operating, and maintenance conditions (operating instructions) specified by the manufacturer as well as the consideration of foreseeable abnormal behaviour and residual dangers.

1.2 User group
TopVent® HV units may only be installed, operated and maintained by authorized and trained skilled personnel. The operating instructions are for English-speaking operating engineers and technicians as well as specialists in building, heating and air technology.

1.3 Operating Modes
TopVent® HV units have the following operating modes:
- Recirculation mode at low fan speed
- Recirculation mode at high fan speed
- Standby
- Off

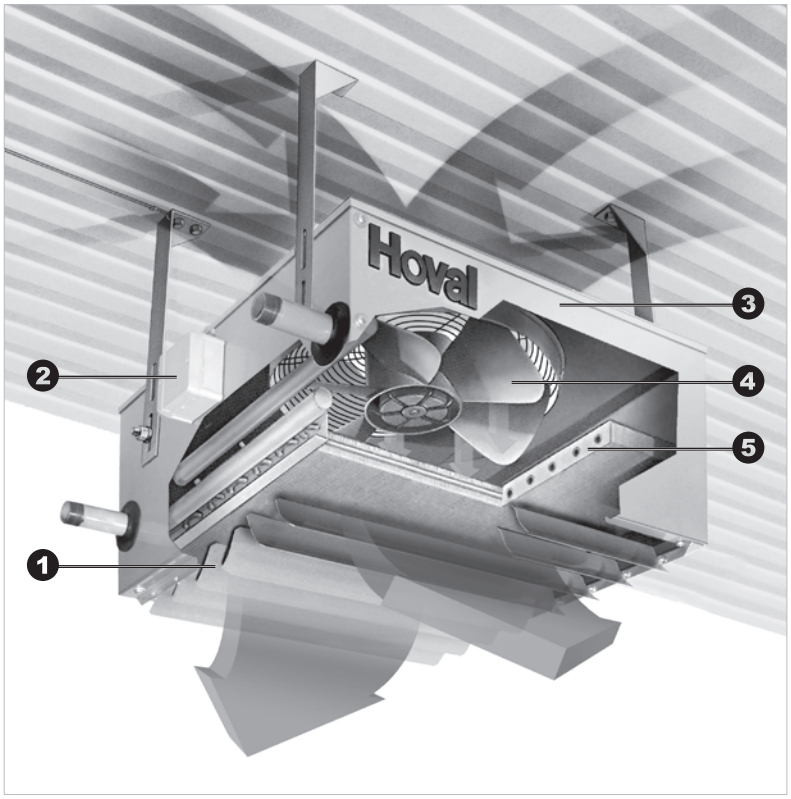
The application limits specified in the Section 'Technical Data' must be complied with.
Any other use or any additional use counts as being improper. The manufacturer shall not be responsible for any damages that may result thereby.

The standard version of the units is not suitable for operation in explosion-prone areas, in wet rooms or in rooms with a high dust incidence.

1.4 Residual dangers
Despite all of the precautionary measures taken, there are residual dangers; these are potential, non-apparent dangers, such as:
- Danger when working on the electrical system.
- When working on the TopVent® unit, parts (e.g. tools) can be dropped.
- Malfunctions due to defective parts
- Danger from hot water when working on the hot water supply.

2 Construction and operation

The TopVent® HV was developed for the cost-effective heating of halls with a height of up to about 6 m. The unit is installed under the ceiling. It takes in room air, heats it in the heating coil and blows it back into the room through the outlet louvre.
There are 3 sizes, each equipped with a 2-speed fan, so that a total of 6 different heating outputs are available.
The TopVent® HV consists of the fan and the heating coil, which are built into a housing made of galvanized sheet steel. A outlet louvre with individually adjustable air guide vanes is installed on the underside.



❶	Outlet louvre: Guide vanes for manual adjustment of the air distribution
❷	Terminal box
❸	Housing: made of galvanized sheet steel
❹	Fan: maintenance-free and low-noise
❺	Heat exchanger: LPHW heating coil consisting of copper tubes with aluminium fins

Fig. I1: Construction of the TopVent® HV

TopVent® HV
Technical data

3 Technical data

Unit type		HV-2		HV-3		HV-5	
Fan speed		**1**	**2**	**1**	**2**	**1**	**2**
Rotational speed (nominal)	min^{-1}	1000	1350	1050	1375	600	900
Nominal air flow rate	m^3/h	1500	2000	2600	3400	3300	5300
Max. floor area reached [1)]	m^2	36	49	49	81	49	121
Power consumption (at 400 V / 50 Hz)	kW	0.08	0.11	0.21	0.29	0.25	0.35
Current consumption (at 400 V / 50 Hz)	A	0.10	0.18	0.28	0.47	0.39	0.72

[1)] Mounting height H_{max} = 5 m with a temperature difference between supply air and room air of up to 30 K

Table I1: Technical data of the TopVent® HV

Type designation code

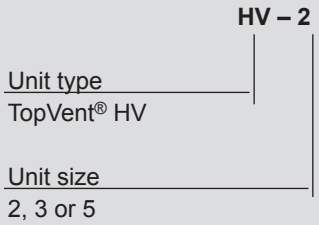


Table I2: Type designation code

Unit type			HV-2		HV-3		HV-5	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Sound pressure level (at a distance of 5 m) [1)]		dB(A)	47	54	51	59	49	59
Total sound power level		dB(A)	69	76	73	81	71	81
Octave sound power level	63 Hz	dB	–	62	–	71	–	75
	125 Hz	dB	–	65	–	76	–	75
	250 Hz	dB	–	73	–	82	–	80
	500 Hz	dB	–	71	–	77	–	77
	1000 Hz	dB	–	68	–	72	–	72
	2000 Hz	dB	–	65	–	67	–	68
	4000 Hz	dB	–	64	–	66	–	66
	8000 Hz	dB	–	56	–	61	–	59

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

Table I3: Sound power values of the TopVent® HV

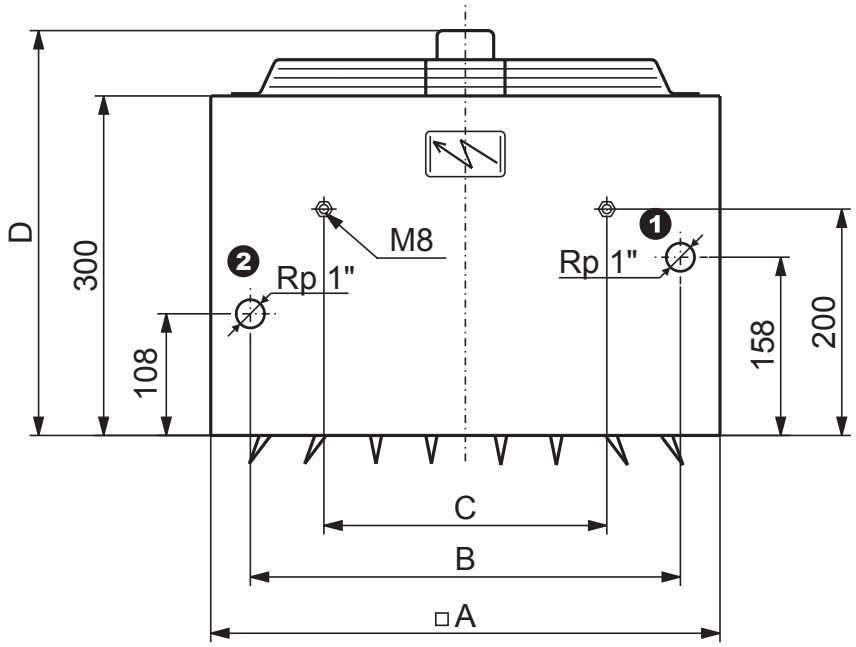
Air inlet temperature			15 °C					20 °C				
Size	**LPHW °C**	**St.**	**Q kW**	**H_{max} m**	**Δp_W kPa**	**t_S °C**	**m_W l/h**	**Q kW**	**H_{max} m**	**Δp_W kPa**	**t_S °C**	**m_W l/h**
HV-2	80/60	1	10	3.5	0.3	35	442	9	3.6	0.3	38	395
		2	12	4.5	0.4	32	521	11	4.7	0.4	36	466
	60/40	1	6	4.4	0.1	26	237	4	4.8	0.1	29	191
		2	6	5.8	0.1	24	278	5	6.4	0.1	27	223
HV-3	80/60	1	18	3.9	3	35	757	16	4.1	2	38	682
		2	21	5.0	4	32	881	19	5.3	3	36	794
	60/40	1	10	4.8	1	26	435	8	5.3	1	29	359
		2	12	6.3	1	25	505	10	6.9	1	28	417
HV-5	80/60	1	26	3.3	3	38	1127	24	3.5	3	41	1015
		2	35	5.1	5	34	1480	31	5.4	4	37	1332
	60/40	1	15	4.1	1	28	643	12	4.4	1	31	530
		2	20	6.5	2	26	840	16	7.1	1	29	691

Legend:

- St. = Fan speed
- Q = Heating output
- H_{max} = Max. mounting height
- Δp_W = Water pressure drop
- t_S = Supply air temperature
- m_W = Water flow rate

Table I4: Heating outputs of the TopVent® HV

TopVent® HV
Technical data



Unit type		HV-2	HV-3	HV-5
A	mm	450	580	730
B	mm	380	510	660
C	mm	240	370	420
D	mm	342	348	354
Weight	kg	18	28	42
Water content of the coil	l	1.2	1.8	2.3

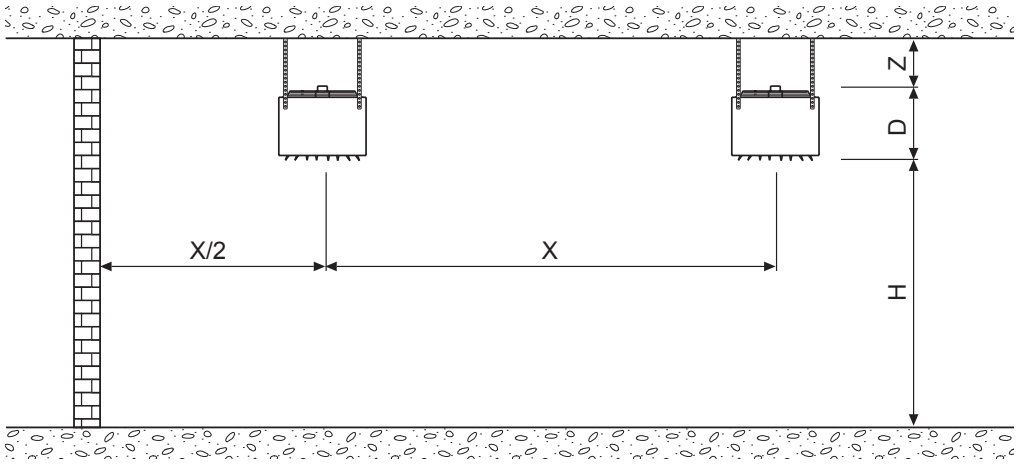
❶	Return
❷	Flow

Table I5: Dimensions and weights of the TopVent® HV

Max. operating pressure	800	kPa
Maximum heating medium temperature	120	°C
Maximum supply air temperature	60	°C
Maximum ambient temperature	40	°C

Table I6: Application limits of the TopVent® HV

Vertical air flow

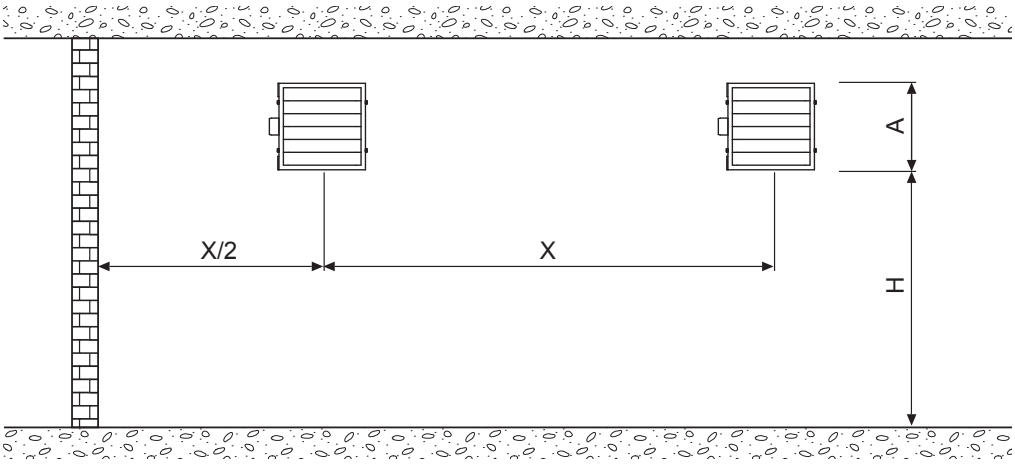


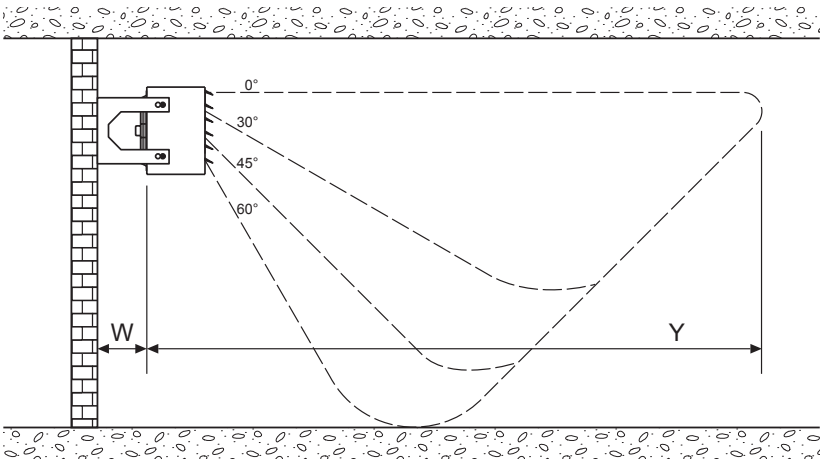
Unit type			HV-2		HV-3		HV-5	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Unit height D		m	0.342	0.342	0.348	0.348	0.354	0.354
Unit clearance X	min.	m	4	5	5	6	6	8
	max.	m	6	7	7	9	7	11
Mounting height H	min.	m	3	3	3	3	3	3
Distance from ceiling Z	min.	m	0.3	0.3	0.3	0.3	0.3	0.3

Table I7: Minimum and maximum distances for vertical air guidance (ceiling mounting)

TopVent® HV
Technical data

Horizontal air flow





Unit type			HV-2		HV-3		HV-5	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Unit height A		m	0.45	0.45	0.58	0.58	0.73	0.73
Unit clearance X	min.	m	4	5	5	6	5	8
	max.	m	6	7	7	10	7	10
Mounting height H	min.	m	2	2	3	3	3	3
Wall clearance W	min.	m	0.54	0.54	0.54	0.54	0.54	0.54
Range Y [1]	max.	m	12	14	15	17	16	20

[1] The vanes of the outlet louvre are directed parallel to the air flow (horizontal = 0°). When the vanes are adjusted the range is reduced as a function of the mounting height.

Table I8: Minimum and maximum distances for horizontal air guidance (wall mounting)

4 Design example

The performance data for the most frequent design rating conditions are specified in Section 3 'Technical Data'. Use the selection program 'HK-Select' to calculate the performance data for other design data (room temperature, heating medium temperature). You can download 'HK-Select' free of charge on the Internet.

4.1 Vertical air flow

Input data ● Geometry of the room (plan) ● Mounting height (= distance between the floor and lower edge of the TopVent® unit) ● Heating load ● Desired room temperature ● Heating medium temperature (flow/return) ● Comfort requirements (acoustic)	**Example** Geometry.....9 x 22 m Mounting height.....4 m Heating load .....38 kW Room temperature.....20 °C Heating medium temperature....60/40 °C Comfort requirements.....Standard
Comfort requirements Define the fan speed in accordance with the acoustic requirements: Low noise level → fan speed 1 Normal noise level → fan speed 2	Standard → fan speed 2
Mounting height ● With the minimum mounting height (Table I7) check which units can be used. ● With the maximum mounting height (Table I4) check which units can be used. ● Strike units which are not adequate.	HV-2 HV-3 HV-5
Minimum number a) Minimum number based on the area In table I1 it is specified what maximum floor area can be covered by the TopVent® DHV. For a known floor area it is then possible to calculate – for each unit size – the minimum number of units required. b) Minimum number based on length x width Depending on the geometry of the hall and in relation to its length and width a certain number of units is required. This can be calculated from the maximum distances between the units and between them and the wall (see Table I7). c) Minimum number based on the heating load Depending on the total heat output required, a minimum number of units can be calculated for each unit size (see Table I4). The highest number from results a), b) and c) is the actual minimum number required.	Calculate the minimum number of units according to a), b) and c) and enter it in a table for each type of unit. Take the highest value as the minimum quantity. **Type** | **a)** | **b)** | **c)** → 8 HV-2 | 4 | 6 | 8 → 8 HV-3 | 3 | 3 | 4 → 4 HV-5 | 2 | 2 | 3 → 3
Definitive number of units Choose the final solution from the remaining possibilities, depending on the geometry of the hall and the costs.	3 units of HV-5

TopVent® HV
Design example

4.2 Horizontal air flow

Input data ● Geometry of the room (plan) ● Mounting height (= distance between the floor and lower edge of the TopVent® unit) ● Heating load ● Desired room temperature ● Heating medium temperature (flow/return) ● Comfort requirements (acoustic)	**Example** Geometry.....14 x 20 m Mounting height.....3.0 m Heating load .....30 kW Room temperature.....15 °C Heating medium temperature....60/40 °C Comfort requirements.....Standard
Comfort requirements Define the fan speed in accordance with the acoustic requirements: Low noise level → fan speed 1 Normal noise level → fan speed 2	Standard → fan speed 2
Mounting height ● With the minimum mounting height (Table I8) check which units can be used. ● With the maximum mounting height (Table I4) check which units can be used. ● Strike units which are not adequate.	HV-2 HV-3 HV-5
Minimum number b) Minimum number based on length x width Depending on the geometry of the hall and in relation to its length and width a certain number of units is required. This can be calculated from the maximum distances between the units and the ranges (see Table I8). c) Minimum number based on the heating load Depending on the total heat output required, a minimum number of units can be calculated for each unit size (see Table I4). The higher number from results a) and b) is the actual minimum number required.	Calculate the minimum number of units according to a), b) and c) and enter it in a table for each type of unit. Take the highest value as the minimum quantity. **Type** | **b)** | **c)** → HV-2 | 3 | 5 → 5 HV-3 | 2 | 3 → 3 HV-5 | 2 | 2 → 2
Definitive number of units Choose the final solution from the remaining possibilities, depending on the geometry of the hall and the costs.	2 units of HV-5

When positioning the units consider the following:
- Do not direct the air current directly at persons.
- Do not install the units at too great a distance from the ceiling, in order to avoid the formation of warm air pockets.
- The units can also be arranged opposite each other or opposite and offset.

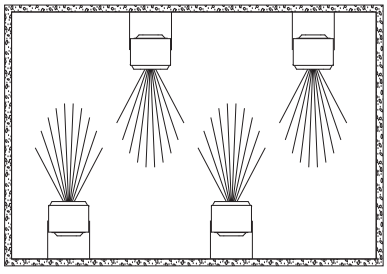


Fig. I3: Offset arrangement of the units on opposing walls

5 Options

You will find a detailed description of all optional components in Section K 'Options' of this handbook.

Suspension set	for mounting appliance on ceiling or on the wall

6 Control systems

For the TopVent® HV there are components for control of the room temperature that have been specially developed by Hoval and optimally matched to the units. You will find a detailed description of these components in Part L 'Control Systems' of this handbook.

6.1 Room temperature control

TempTronic RC	This is a programmable, electronic temperature controller for fully automatic operation. Its control algorithm with fuzzy logic ensures extremely small control deviations and minimizes energy consumption.
EasyTronic	This is a simple temperature controller without a time switch. The room’s setpoint temperature is adjusted manually and the desired fan speed is selected by means of a switch.

7 Transport and installation

Transport and assembly work to be carried out only by trained specialists!

A hoist is required for transport and installation of the components! Do not tilt the unit or lay it flat!

7.1 Installation

For ceiling installation the units are equipped as standard with 4 M8 threaded bolts with nuts and washers. With these bolts and the suspension set (optional) the unit can be easily fastened to the ceiling.

The rivet nuts are only dimensioned for the unit's own weight. Do not fasten any additional loads!

The rivet nuts cannot take a bending moment; no eyebolts may be used!

Other fastenings with flat bars, perforated bars and angle section, but with steel cables as well, are also possible, however, the following instructions have to be heeded without fail:

- Lateral, inclined suspensions are allowed up to a maximum angle of 45°.
- The unit must be installed horizontally!

7.2 Hydraulic Installation

Have the hydraulic installation performed by skilled personnel only!

- Combine units that run under the same operating conditions (room temperature, heat gains, operating time etc.) to form a control group.
- Warm or hot water up to a maximum of 120 °C can be used as the heating medium. For energy saving purposes a pre-regulation of the distributor is possible; however, it has to be ensured that the heat requirement of the individual heating coils can be met in any case.
- Connect the heating coils in accordance with Fig. I4. Depending on local circumstances it has to be checked whether compensators for the supply and return lines for compensation of the linear expansion and/or articulated connections are required for the units.

The coil cannot bear any loads, e.g. by means of the flow or return lines!

- Hydraulically balance the individual units with one another so that uniform pressure admission is ensured.

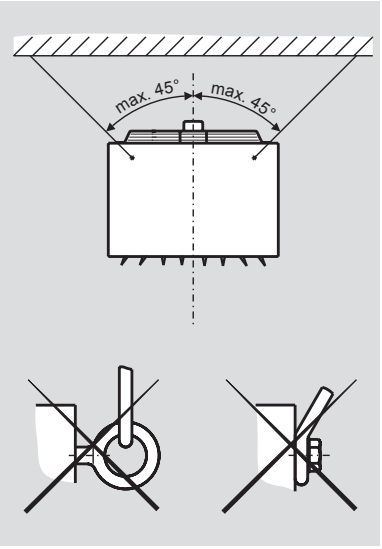
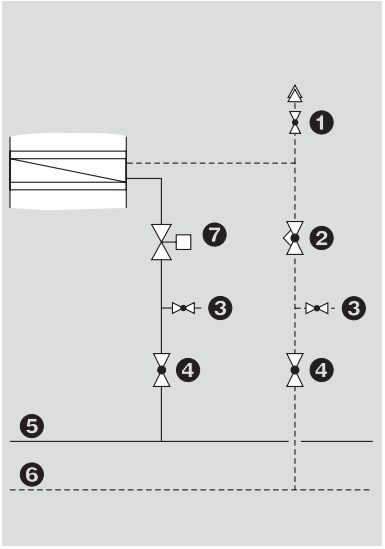


Fig. I3: Suspension of the TopVent® HV



❶	Vent with shut-off device
❷	Flow control valve
❸	Drain cocks
❹	Shut-off valves
❺	Flow
❻	Return
❼	Control valve

Fig. I4: Connection of the heating coil

7.3 Electrical installation

The electrical connection must be performed up to the unit by a certified skilled electrician. The applicable regulations have to be observed (e.g. EN 60204-1).

The unit is supplied ready to operate.

- Check whether the local operating voltage, frequency and fuse protection match the data on the type plate. If there are any discrepancies, the unit must not be connected!
- For long leads the cable cross-sections must be selected according to the technical regulations, e. g. VDE 0100.
- Perform the electrical installation work in accordance with wiring diagram of the control system.
- Connect the TopVent® HV units in accordance with the terminal diagram.

Connect the thermal contacts that are built into the motor. Only then is the motor protected against overheating.

- Do not forget the main switch for the complete system (control system and units).
- Several TopVent® units can be connected by means of a parallel circuit.

Wire the thermal contacts in series!

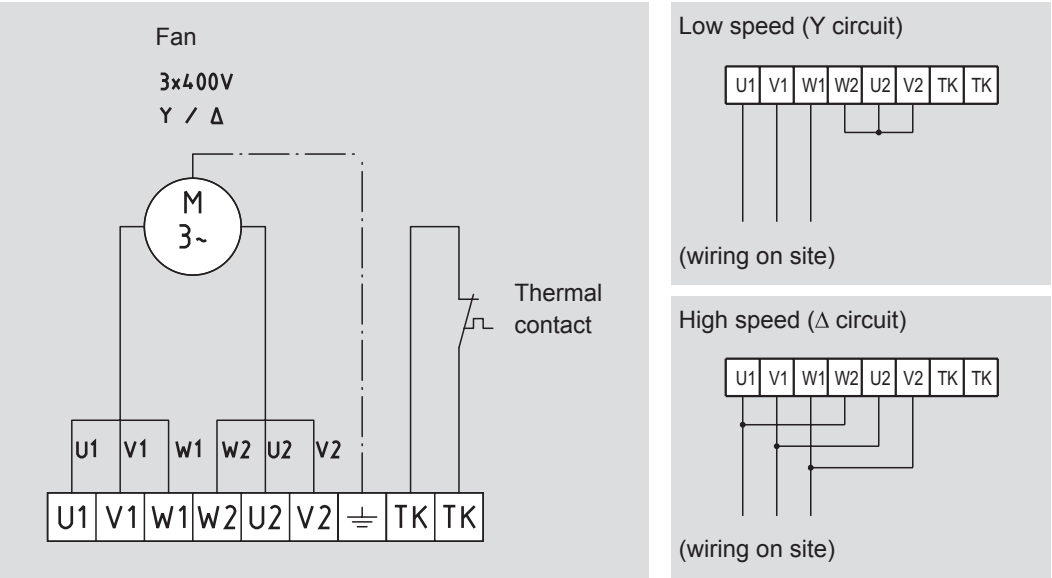


Fig. I5: Terminal diagram for TopVent® HV

TopVent® HV
Specification texts

8 Specification texts

8.1 TopVent® HV
Recirculation unit heater for rooms with up to 6 m height

Housing made of galvanized sheet steel, standard equipment with 4 threaded bolts M8 with nuts and washers for ceiling installation.
Heat exchanger made from copper tubes and aluminium fins, manifolds and distributor made from steel.
Fan unit consisting of a 2-speed, 3-phase external rotor motor with pressure-resistant aluminium die-cast blades, maintenance-free and quiet, with a high degree of efficiency rating. Motor protection through built-in thermal contacts.
Protection class IP44.
Terminal box integrated on the side inside of the housing to connect supply voltage.
Outlet louvre with individually adjustable air guide vanes.

Technical data

Fan speed	1	2	
Nominal air flow rate	_____	_____	m³/h
Floor area reached	_____	_____	m²
Mounting height	_____	_____	m
Nominal heating output	_____	_____	kW
with LPHW	_____	_____	°C
and air inlet temperature	_____	_____	°C
Power consumption	_____	_____	kW
Current consumption	_____	_____	A
Voltage	400 V / 50 Hz		

HV-2
HV-3
HV-5

8.2 Options

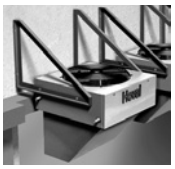
■ Suspension set AW
for wall or ceiling installation of the units, consisting of 2 sheet metal brackets

■ Suspension set AD
for ceiling installation of the units, consisting of 4 flat bars and brackets

8.3 Control systems

■ Room temperature control by the TempTronic RC
Programmable regulation system with menu-guided operator control for fully-automatic operation of the TopVent® units:
- TempTronic RC, operator control terminal as a wall unit in a plastic housing with an integrated room temperature sensor
- RC station RCS for the power supply and control of several TopVent® units in parallel operation
- RC single station RCE for the power supply and control of a single TopVent® unit
- Optional module OM for the control of additional functions, as a wall unit in a plastic housing
- Room temperature sensor RF for the connection in place of the room temperature sensor that is integrated into the TempTronic RC, in a plastic housing for wall-mounted installation
- Room temperature mean value MRT4, 4 room temperature sensors for installation in the occupied area

■ Room temperature control by means of EasyTronic
Single switching device with 2-point regulation and manual changeover between speed levels 1 and 2
- EasyTronic ET, switching device for heating mode, as a wall unit in a plastic housing, including room thermostat



TopVent® curtain

Air curtain

TopVent® curtain
Use

1 Use

1.1 Intended use
The TopVent® curtain unit is a recirculation unit heater with an outlet nozzle for use as an air curtain for doors of up to 6 m in height.
Proper use also includes observance of the mounting, commissioning, operating, and servicing conditions (operating instructions) specified by the manufacturer as well as the consideration of foreseeable abnormal behaviour and residual dangers.

1.2 User group
TopVent® curtain units may only be installed, operated and maintained by authorized and trained skilled personnel. The operating instructions are for English-speaking operating engineers and technicians as well as specialists in building, heating and air technology.

1.3 Operating modes
TopVent® curtain units have the following operating modes:
- Recirculation mode at low fan speed
- Recirculation mode at high fan speed
- Standby
- Off

The application limits specified in the Section 'Technical Data' must be complied with.
Any other or any additional use counts as improper. The manufacturer shall not be responsible for any damages that may result thereby.

The units are not suitable for operation in explosion-prone areas, in wet rooms or in rooms with a high dust incidence.

1.4 Residual dangers
Despite all of the precautionary measures taken, there are residual dangers; these are potential, non-apparent dangers, such as:
- Danger when working on the electrical system.
- When working on the TopVent® unit, parts (e.g. tools) can be dropped.
- Malfunctions due to defective parts
- Danger from hot water when working on the hot water supply.

2 Construction and operation

The TopVent® curtain is a recirculation unit heater with an outlet nozzle for use as an air curtain for doors of up to 6 m in height. Several TopVent® curtain units are mounted over the hall door. They take in the room air, heat it in the heating coil and blow it downwards through the outlet nozzle. The air curtain that is created minimizes any external influences on the room climate. It prevents the incidence of cold and increases the usable area in the hall.
There are 3 sizes, each equipped with a 2-speed fan, making available a total of 6 different heating outputs.
The TopVent® curtain consists of the heating section (with fan and heating coil) and the outlet nozzle.

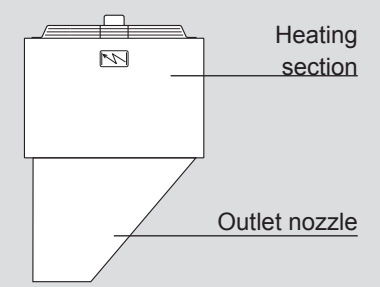


Fig. J1: Components of the TopVent® curtain

❶	Outlet nozzle
❷	Terminal box
❸	Fan: maintenance-free and low-noise
❹	Heat exchanger: LPHW heating coil consisting of copper tubes with aluminium fins
❺	Housing: made of galvanized sheet steel

Fig. J2: Construction of the TopVent® curtain

TopVent® curtain
Technical data

3 Technical data

Unit type		CUR-2		CUR-3		CUR-5	
Fan speed		**1**	**2**	**1**	**2**	**1**	**2**
Rotational speed (nominal)	min^{-1}	1000	1350	1050	1375	600	900
Nominal air flow rate	m^3/h	1500	2000	2600	3400	3300	5300
Max. floor area reached [1)]	m^2	36	49	49	81	49	121
Power consumption (at 400 V / 50 Hz)	kW	0.08	0.11	0.21	0.29	0.25	0.35
Current consumption (at 400 V / 50 Hz)	A	0.10	0.18	0.28	0.47	0.39	0.72

[1)] Mounting height H_{max} = 5 m with a temperature difference between supply air and room air of up to 30 K

Table J1: Technical data of the TopVent® curtain

Type designation code

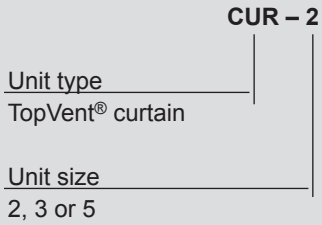


Table J2: Type designation code

Unit type			CUR-2		CUR-3		CUR-5	
Fan speed			**1**	**2**	**1**	**2**	**1**	**2**
Sound pressure level (at a distance of 5 m) [1)]		dB(A)	47	54	51	59	49	59
Total sound power level		dB(A)	69	76	73	81	71	81
Octave sound power level	63 Hz	dB	–	62	–	71	–	75
	125 Hz	dB	–	65	–	76	–	75
	250 Hz	dB	–	73	–	82	–	80
	500 Hz	dB	–	71	–	77	–	77
	1000 Hz	dB	–	68	–	72	–	72
	2000 Hz	dB	–	65	–	67	–	68
	4000 Hz	dB	–	64	–	66	–	66
	8000 Hz	dB	–	56	–	61	–	59

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

Table J3: Sound power values of the TopVent® curtain

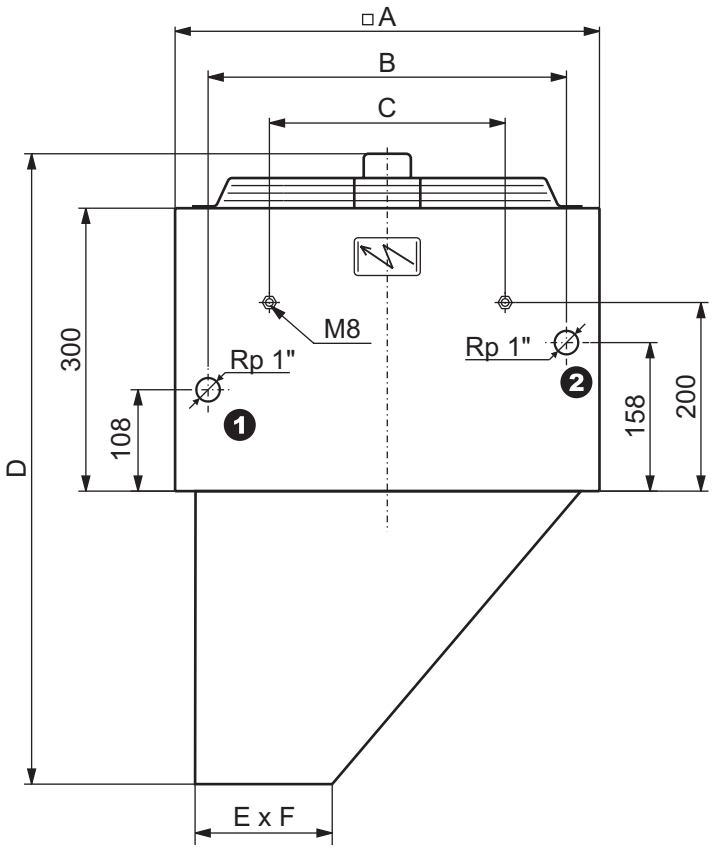
TopVent® curtain
Technical data

Air inlet temperature			15 °C				20 °C			
Size	**LPHW °C**	**St.**	**Q kW**	**Δp_W kPa**	**t_S °C**	**m_W l/h**	**Q kW**	**Δp_W kPa**	**t_S °C**	**m_W l/h**
CUR-2	80/60	1	10	0.3	35	442	9	0.3	38	395
		2	12	0.4	32	521	11	0.4	36	466
	60/40	1	6	0.1	26	237	4	0.1	29	191
		2	6	0.1	24	278	5	0.1	27	223
CUR-3	80/60	1	18	3	35	757	16	2	38	682
		2	21	4	32	881	19	3	36	794
	60/40	1	10	1	26	435	8	1	29	359
		2	12	1	25	505	10	1	28	417
CUR-5	80/60	1	26	3	38	1127	24	3	41	1015
		2	35	5	34	1480	31	4	37	1332
	60/40	1	15	1	28	643	12	1	31	530
		2	20	2	26	840	16	1	29	691

Legend:
St. = Fan speed
Q = Heating output
Δp_W = Water pressure drop
t_S = Supply air temperature
m_W = Water flow rate

Table J4: Heating outputs of the TopVent® curtain

TopVent® curtain
Technical data



Unit type		CUR-2	CUR-3	CUR-5
A	mm	450	580	730
B	mm	380	510	660
C	mm	240	370	420
D	mm	647	703	774
E x F	mm	391 x 160	521 x 240	651 x 285
Weight	kg	22	36	53
Water content of the coil	l	1.2	1.8	2.3

❶ Flow
❷ Return

Table J5: Dimensions and weights of the TopVent® curtain

Max. operating pressure	800	kPa
Maximum heating medium temperature	120	°C
Maximum supply air temperature	60	°C
Maximum ambient temperature	40	°C

Table J6: Application limits of the TopVent® curtain

4 Design example

Use the selection program 'HK-Select' to rate TopVent® curtain overdoor air curtains. You can download it free of charge on the Internet.

HK-Select calculates the number of TopVent® curtain units that are required for the air curtain from the following specifications:

- Door width, door height
- Sea level
- Wind speed (10 m above ground level)
- Outdoor temperature and humidity
- Room temperature
- Heating medium temperature (flow/return)

5 Options

No optional components are available for the TopVent® curtain.

6 Control systems

For the TopVent® curtain there are components for control of the room temperature that have been specially developed by Hoval and optimally matched to the units. You will find a detailed description of these components in Section L 'Control Systems' of this handbook.

6.1 Room temperature control

TempTronic RC	This is a programmable, electronic temperature controller for fully automatic operation. Its control algorithm with fuzzy logic ensures extremely small control deviations and minimizes energy consumption.

7 Transport and installation

Transport and assembly work to be carried out only by trained specialists!

A hoist is required for transport and installation of the components! Do not tilt the unit or lay it flat!

7.1 Installation

Prior to installation check whether the coil connections and the outlet cone are in the correct position relative to one another. If not, undo the screw connection between the outlet nozzle and the heating section, turn it to the required position and screw it back on.
The units are equipped as standard with 4 M8 threaded bolts with nuts and washers. By means of these bolts, flat bars and angle section the unit can easily be fastened over the door in accordance with the system layout (i.e. at the calculated spacings).

The rivet nuts are only dimensioned for the unit's own weight. Do not fasten any additional loads!

The rivet nuts cannot take a bending moment; no eyebolts may be used!

The unit must be installed horizontally!

7.2 Hydraulic installation

Have the hydraulic installation performed by skilled personnel only!

- Combine units that run under the same operating conditions (room temperature, heat gains, operating time etc.) to form a control group.
- Warm or hot water up to a maximum of 120 °C can be used as the heating medium. For energy saving purposes a pre-regulation of the distributor is possible; however, it has to be ensured that the heat requirement of the individual heating coils can be met in any case.
- Connect the heating coils in accordance with Fig. J4. Depending on local circumstances it has to be checked whether compensators for the supply and return lines for compensation of the linear expansion and/or articulated connections are required for the units.

The coil cannot bear any loads, e.g. by means of the flow or return lines!

- Hydraulically balance the individual units with one another so that uniform pressure admission is ensured.

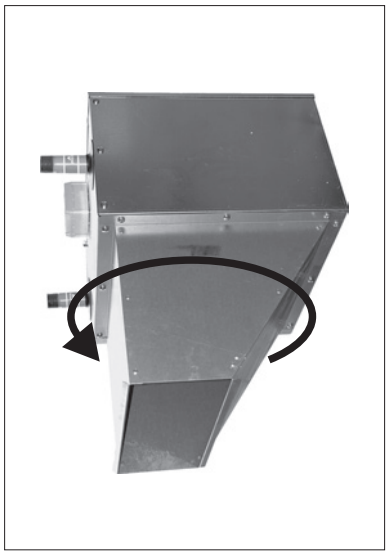
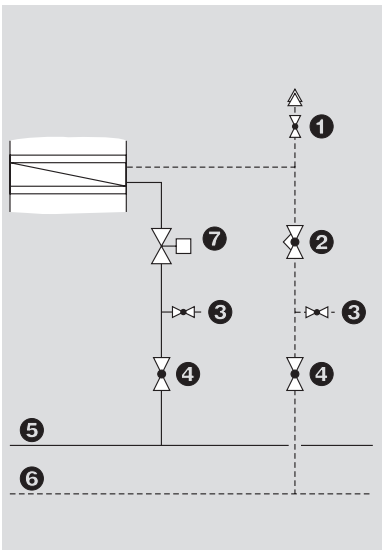


Fig J3: Turn the outlet nozzle to the required position



1	Vent with shut-off device
2	Flow control valve
3	Drain cocks
4	Shut-off valves
5	Flow
6	Return
7	Control valve

Fig. J4: Connection of the heating coil

7.3 Electrical installation

The electrical connection must be performed up to the unit by a certified skilled electrician. The applicable regulations have to be observed (e.g. EN 60204-1).

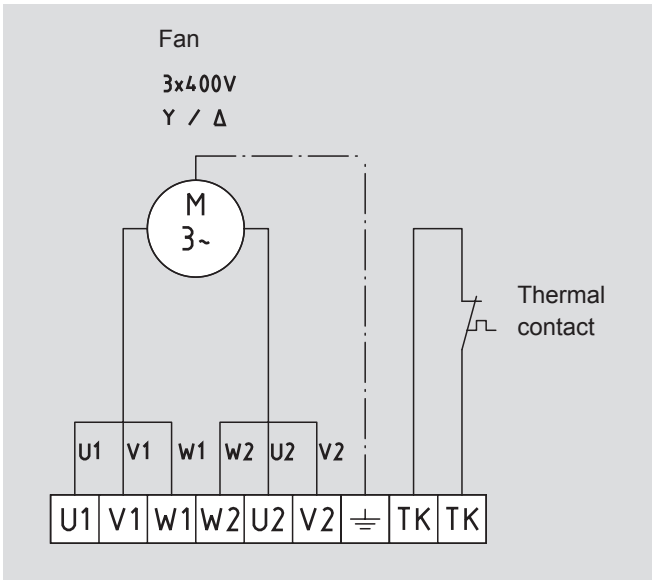
The unit is supplied ready to operate.

- Check whether the local operating voltage, frequency and fuse protection match the data on the type plate. If there are any discrepancies, the unit must not be connected!
- For long leads the cable cross-sections must be selected according to the technical regulations, e. g. VDE 0100.
- Perform the electrical installation work in accordance with the wiring diagram of the control system.
- Connect the TopVent® curtain units in accordance with the terminal diagram.

Connect the thermal contacts that are built into the motor. Only then is the motor protected against overheating.

- Do not forget the main switch for the complete system (control system and units).
- Several TopVent® units can be connected by means of a parallel circuit.

Wire thermal contacts in series!



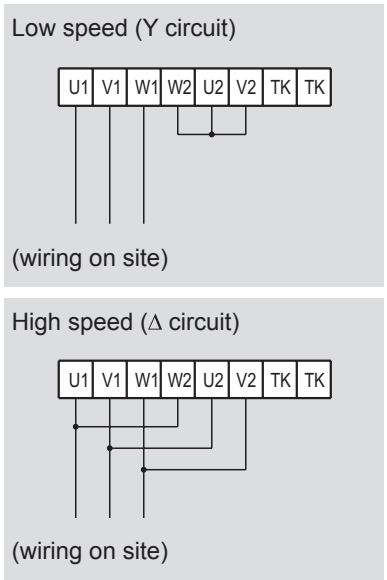


Fig. J5: Terminal diagram for TopVent® curtain

TopVent® curtain
Specification texts

8 Specification texts

8.1 TopVent® curtain
Air curtain

Housing made of galvanized sheet metal, equipped as standard with 4 M8 threaded bolts with nuts and washers for fastening and suspension.
Heat exchanger made from copper tubes and aluminium fins, manifolds and distributor made from steel.
Fan unit consisting of a 2-speed, 3-phase external rotor motor with pressure-resistant aluminium die-cast blades, maintenance-free and quiet, with a high degree of efficiency rating. Motor protection through built-in thermal contacts.
Protection class IP44.
Terminal box integrated into the side of the housing to connect supply voltage.
Outlet nozzle made of galvanized sheet steel.

Technical data

Fan speed	1	2	
Nominal air flow rate	_____	_____	m³/h
Nominal heating output	_____	_____	kW
with LPHW	_____	_____	°C
and air inlet temperature	_____	_____	°C
Power consumption	_____	_____	kW
Current consumption	_____	_____	A
Voltage	400 V / 50 Hz		

CUR-2
CUR-3
CUR-5

8.2 Control systems

■ Room temperature control by the TempTronic RC
Programmable regulation system with menu-guided operator control for fully automatic operation of the TopVent® units:

- TempTronic RC, operator control terminal as a wall unit in a plastic housing with an integrated room temperature sensor
- RC station RCS for the power supply and control of several TopVent® units in parallel operation
- RC single station RCE for the power supply and control of a single TopVent® unit
- Optional module OM for the control of additional functions, as a wall unit in a plastic housing
- Room temperature sensor RF for connection in place of the room temperature sensor that is integrated into the TempTronic RC, in a plastic housing for wall-mounted installation
- Room temperature mean value MRT4, 4 room temperature sensors for installation in the occupied area

Options

TopVent®
Options

1 Availability

The following optional components are available for the various types of unit:

	Paint finish	Suspension set	Isolation switch	Actuator for Air-Injector	Actuator for mixed air box	Filter box	Flat filter box	Acoustic cowl	Recirculation silencer	Air outlet box	Insulation	Condensate pump	Hydraulic assembly	Explosion-proof design
TopVent® DHV	o	o	o	o	–	o	o	o	o	o	–	–	–	o [1)]
TopVent® DKV	o	o	o	o	–	o	o	o	o	o	o	o	–	–
TopVent® NHV	o	o	o	–	–	–	o	–	o	–	–	–	–	o [1)]
TopVent® commercial CAU	o	–	●	o	●	–	–	o	–	–	o	o	o	–
TopVent® commercial CUM	o	–	●	o	–	–	o	o	–	–	o	o	o	–
TopVent® MH	o	o	o	o	o	●	–	o	–	–	o	–	–	o [1)]
TopVent® MK	o	o	o	o	o	●	–	o	–	–	o	o	–	–
TopVent® HV	–	o	–	–	–	–	–	–	–	–	–	–	–	–
TopVent® curtain	–	–	–	–	–	–	–	–	–	–	–	–	–	–

[1)] Only the unit sizes 6 and 9 are available in an explosion-proof design.

Legend: – = Not available
o = Available as option
● = Standard equipment

Table K1: Availability of optional extras

2 Paint finish

On request, the TopVent® units can be provided with a paint finish (Aluzinc is standard). There are 2 possibilities:

2.1 Standard paint finish

The individual unit components are painted in the standard Hoval colours at no extra cost:

- Air-Injector, outlet box _____ orange (RAL 2008)
- Heating section, heating/cooling section _____ red (RAL 3000)
- Suspension set _____ red (RAL 3000)
- Filter box, flat filter box _____ red (RAL 3000)
- Mixed air box _____ red (RAL 3000)
- Recirculation silencer _____ red (RAL 3000)
- Roof hood _____ not painted

2.2 Paint finish as desired

In order for them to harmonize with the room colour, all unit components can be supplied with a paint finish in any colour (at an additional cost, when ordering quote the RAL number).

3 Suspension set

Suspension sets available for easy installation of the units on the ceiling or wall. There are three variants:

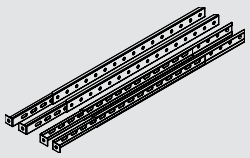
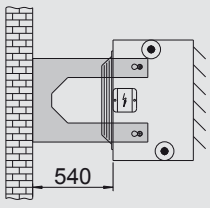
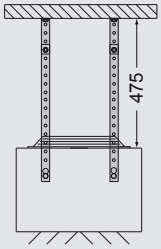
Type	Layout	Use with	
AHS		TopVent® DHV, NHV, DKV, MH, MK	• of Aluzinc sheet steel • height adjustable to a maximum of 1300 mm
AW		Wall or ceiling installation TopVent® HV	• 2 sheet metal brackets
AD		Ceiling mounting TopVent® HV	• 4 flat bars and brackets

Table K2: Suspension sets

TopVent®
Options

4 Isolation switch

An isolation switch that is operated from the outside can be built into the terminal box of the TopVent® units.

Only the fan is switched off by the isolation switch. Control components can continue to carry a live voltage!

Fig. K1: Actuator

5 Actuator

5.1 Actuator for Air-Injector

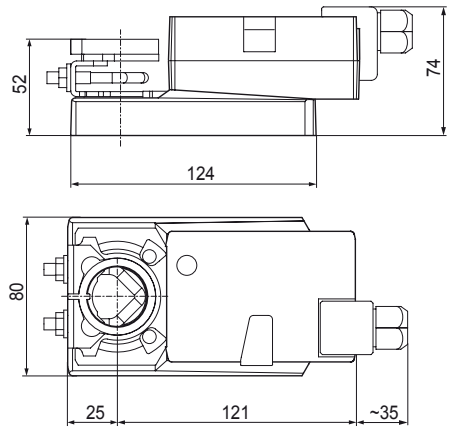
An actuator can be supplied (type VT-AS) for adjustment of the Air-Injector by means of a non-Hoval controller. The actuator adjusts the guide vanes of the Air-Injector within an angular range of 0° (= vertical air outlet) to 50° (= horizontal air outlet). The mechanical stops have to be appropriately adjusted.

In order that the position of the guide vanes is clear even after switching on, the actuator always runs through the following starting cycle (duration approx. 3 mins.):
actual position → 0° → 50° → target position

5.2 Actuator for mixed air box

An actuator can be supplied (type MLK-A) for adjustment of the fresh air damper and recirculation damper by means of a non-Hoval controller. This actuator adjusts the dampers within an angular range of 0° (= 0 % fresh air) to 90° (= 100 % fresh air).

In order that the position of the dampers is clear even after switching on, the actuator always runs through the following starting cycle (duration approx. 3 mins.):
actual position → 0° → 90° → target position



Type	VT-AS	MLK-A
Rated voltage	AC 24 V, 50 Hz	AC 24 V, 50 Hz
Actuating signal Y	DC 0..10 V	DC 0..10 V
Operating range	DC 2..10 V	DC 2..10 V
Torque	10 Nm	10 Nm
Runtime	150 s	150 s

Table K3: Dimensions and technical data of the actuators

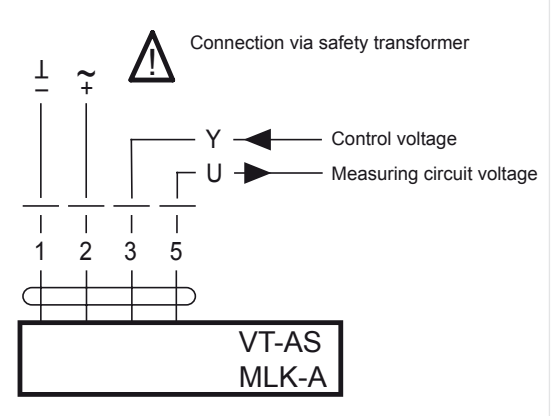


Fig. K2: Connection diagram for the actuators

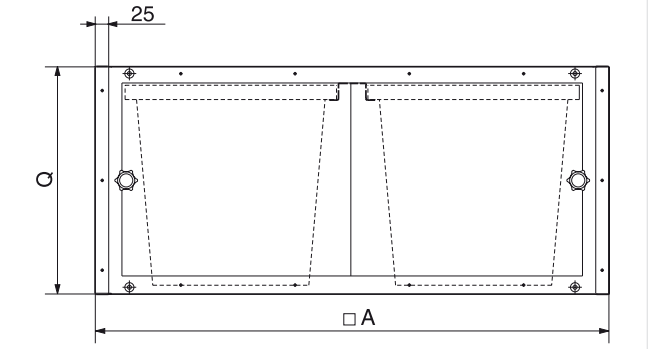
6 Filter box

A filter box with 2 class G4 bag filters (DIN EN 779) can be installed – or retrofitted – for the purpose of filtering the recirculation air. The modular construction made of Aluzinc sheet metal with 2 sliding doors makes it easy to replace the filters.

In the planning phase take into consideration that there must be enough space in front of the sliding door to change the filters.

Due to the additional pressure drop the performance specifications of the relevant TopVent® unit are decreased:
- the air flow rate (and mounting height) by about 13 %
- the heating and cooling capacities by approx. 8 %

A pressure difference control device is installed for automatic monitoring of the filter. It shows when the filters have to be cleaned or changed.



Type		FK-6	FK-9/10
A	mm	900	1100
Q	mm	400	400
Total filter area	m²	2.8	5.2
Filter dimensions	mm	740 x 370 x 300	940 x 470 x 300
Number of filters	–	2	2
Weight	kg	24	28

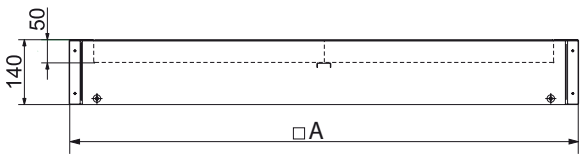
Table K4: Dimensions and weights of the filter box

7 Flat filter box

A flat filter box can be installed – or retrofitted – for the purpose of filtering the recirculation air. 4 pleated cell-type filters of class G4 can be installed in it.

Due to the additional pressure drop the performance specifications of the TopVent® unit are decreased:
- the air flow rate (and mounting height) by about 9 %
- the heating and cooling capacities by approx. 8 %

A pressure difference control device is installed for automatic monitoring of the filter. It shows when the filters have to be cleaned or changed.



Type		FFK-6	FFK-9/10
A	mm	900	1100
Total filter area	m²	5.8	8.8
Filter dimensions	mm	393 x 393 x 47	495 x 495 x 47
Number of filters	–	4	4
Weight	kg	9	11

Table K5: Dimensions and weights of the flat filter box

8 Acoustic cowl

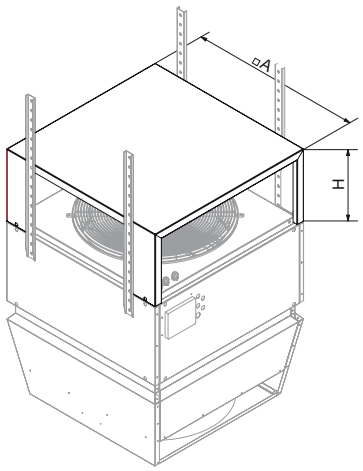
The acoustic cowl reduces the noise level in the room; it is installed in the Air-Injector. This does not change the outside dimensions of the Air-Injector.
The insertion attenuation is 4 dB compared with the total sound power of the relevant TopVent® unit.

TopVent®
Options

9 Recirculation silencer

The use of a recirculation silencer for noise reduction is recommended mainly if the TopVent® units are installed under flat, hard ceilings (e.g. made of concrete or sheet steel).
The recirculation silencer is mounted on the unit and thus reduces the sound reflection from the ceiling. The insertion attenuation is 3 dB(A) compared with the total sound power of the relevant TopVent® unit.
Mount the recirculation units as usual via the 4 fastening points in the heating or heating/cooling section (for example by means of the optional suspension set).

Do not arrange any suspension points in the recirculation silencer! The silencer is not suitable for bearing the weight of the TopVent® unit!



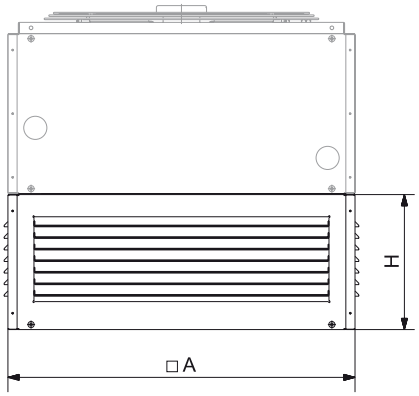
Type		USD-6	USD-9/10
A	mm	900	1100
H	mm	380	485
Weight	kg	15	20

Table K6: Dimensions and weights of the recirculation silencer

10 Air outlet box

When using TopVent® units in lowceiling spaces, an outlet box can be mounted in place of the Air-Injector. This reduces the minimum mounting height by 1 m compared to the standard design.
The air outlet box has horizontal air discharge grilles on all sides. The vanes can be manually adjusted without tools to adapt the air discharge angle to the local conditions.

The air outlet box replaces the Air-Injector. The total height of the unit is consequently reduced; the weight remains roughly the same.



Type		AK-6	AK-9/10
A	mm	900	1100
H	mm	350	400
Weight	kg	36	53

Table K7: Dimensions and weights of the air outlet box

11 Insulation

The insulation prevents humid room air from condensing on the cold external walls of the TopVent® units. This can happen in cooling mode or when admixing fresh air. In addition the noise level is reduced (very slightly).
The following components can be insulated:

- Air-Injector
- Mixed air box
- Filter box

The heating/cooling section in the TopVent® unit is insulated as standard.

The external dimensions of the TopVent® units are not altered by the insulation. The increase in pressure loss due to the narrowing of the cross section is negligible.

12 Condensate pump

TopVent® cooling units must be connected to a condensate drainage system. For applications in which connection to the waste water system is too expensive or not possible for structural reasons, a condensate pump can be provided. This pump is installed laterally on the unit, directly under the condensate drain connection. It pumps the condensate through a flexible hose to a delivery height of 3 m, thus enabling discharge of the condensate

- through waste water pipes directly below the ceiling,
- onto the roof.

Type		KP
Output (at 3 m delivery height)	l/h	150
Tank capacity	l	1.9
Dimensions (L x W x H)	mm	288 x 127 x 178
Weight	kg	2.4

Table K8: Technical data of the condensate pump

13 Hydraulic assembly

Assemblies for hydraulic diversion switching that are optimally matched to the units are available for the easy installation of TopVent® commercial units. There are 2 versions, whose only difference is the mixing valve:

- Fresh air hydraulic assembly HG-9/D/AU (fast solenoid actuator)
- Recirculation air hydraulic assembly HG-9/D/UM (actuator with an actuation time of 30 s)

Please note the following:

- Thermally insulate the hydraulic assembly on site.
- To ensure correct operation, install the hydraulic assembly horizontally.

Mount the hydraulic assembly so that its weight does not need to be absorbed by the coil.

■ Default settings for the hydraulic alignment

Read the settings from diagram K1.

The curves 1.0 to 4.0 correspond to the revolutions of the valve spindles of the balancing valve; they are shown on the turning knob:

0.0 __ Valve closed

4.0 __ Valve fully open

The coil and the hydraulic assembly are already included in the specified pressure drop. Therefore consider the pressure drop in the distribution network only up to the screw unions (item 5 in Fig. K3).

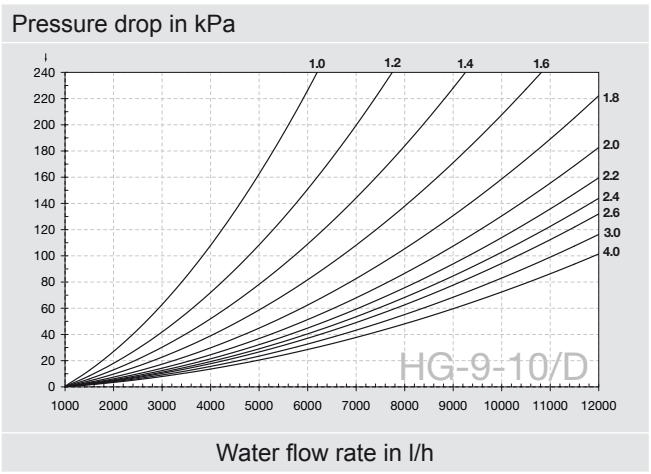
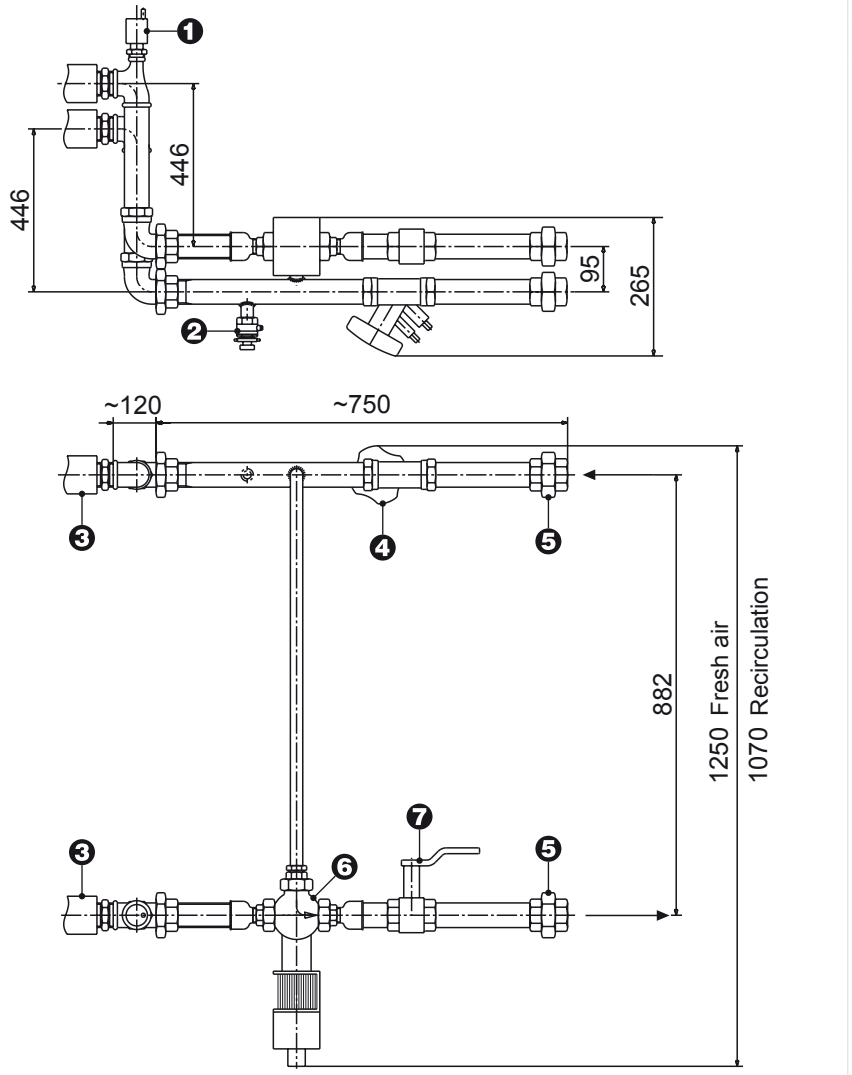


Diagram K1: Settings for the control valves

TopVent®
Options



❶	Automatic air vent
❷	Drain cock
❸	Flow/return adapter with screw union for coil connection
❹	Control valve STAD DN 50
❺	Screw union distribution network 2"
❻	Mixing valve
❼	Ball valve

Fig. K3:
Dimensions of the hydraulic assembly (in mm)

Type	HG-9/D/AU	HG-9/D/UM
Feed voltage	AC 24 V / 50 Hz	AC 24 V / 50 Hz
Control voltage	DC 0..10 V	DC 0..10 V
Run time of actuator	< 1 s	30 s

Table K9: Technical data of the mixing valves

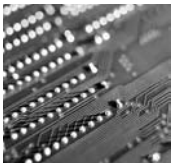
Max. operating pressure	1000	kPa
Heating/cooling medium temp.	2…120	°C
Ambient temperature	-5…45	°C
Maximum air humidity	95	% rF

Table K10: Application limits of the hydraulic assembly

14 Explosion-proof design

TopVent® explosion-proof units of the types DHV/EX, NHV/EX and MH/EX are for the purpose of heating and ventilating halls in which an explosive atmosphere occasionally occurs (zone 1).

For more detailed information on explosion-proof unit versions please contact Hoval's application consulting department.



Control systems

Control systems
Availability

1 Availability

The following control system components are available for the different appliances:

	TempTronic RC	EasyTronic	Manual control of the air distribution
TopVent® DHV	●	●	●
TopVent® DKV	●	–	●
TopVent® NHV	●	●	–
TopVent® commercial CAU	●	–	●
TopVent® commercial CUM	●	–	●
TopVent® MH	●	–	●
TopVent® MK	●	–	●
TopVent® HV	●	●	–
TopVent® curtain	●	–	–
Legend:	● available – not available		

Table L1: Availability of control system components

2 TempTronic RC

2.1 Intended use

The TempTronic RC is an electronic controller for TopVent® units. Communication is via a low-voltage bus system. TempTronic RC cannot be used for 24 V, 230 V or other signals. An option module is available for the control of additional functions.

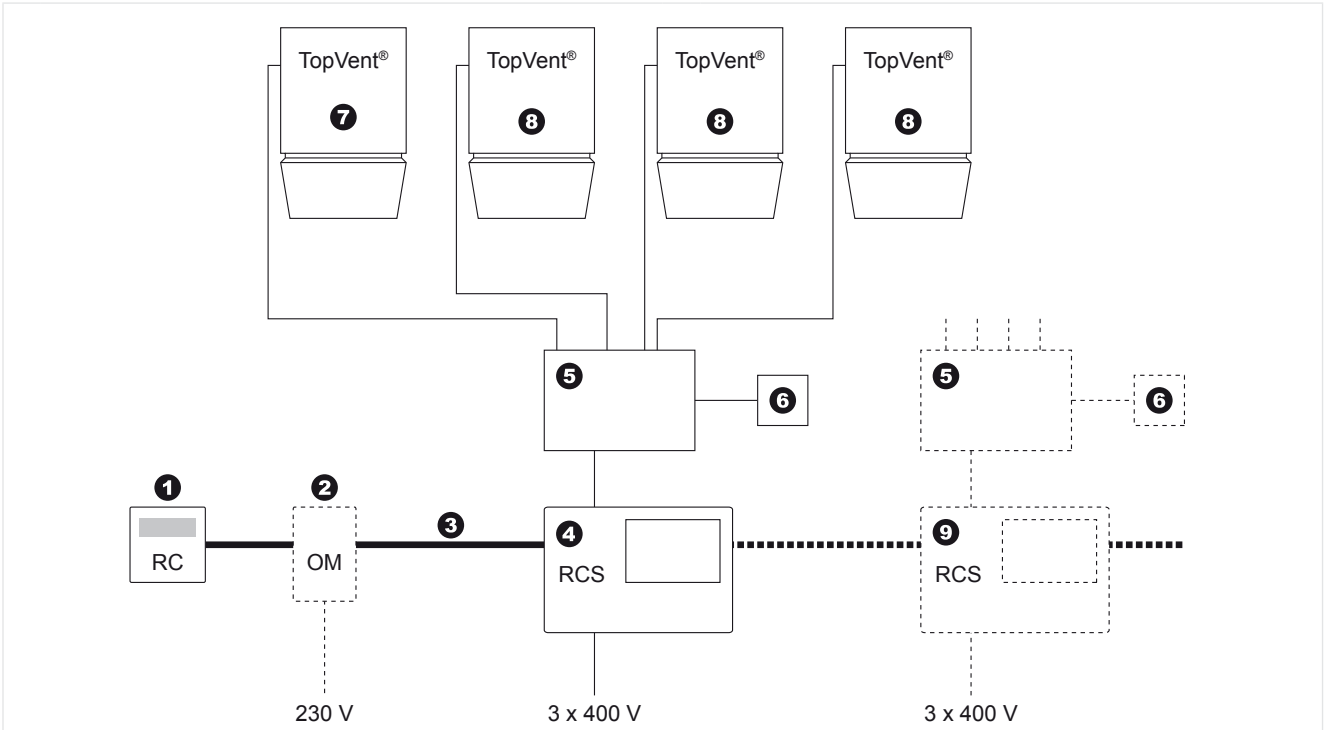
2.2 System structure

The control system consists of the following components:

- TempTronic RC with an integrated room temperature sensor as an operator control terminal
- RC station for the power supply and control of several TopVent® units in parallel operation
- RC single station for the power supply and control of a single TopVent® unit
- An option module is available for the control of additional functions (if required)
- System bus

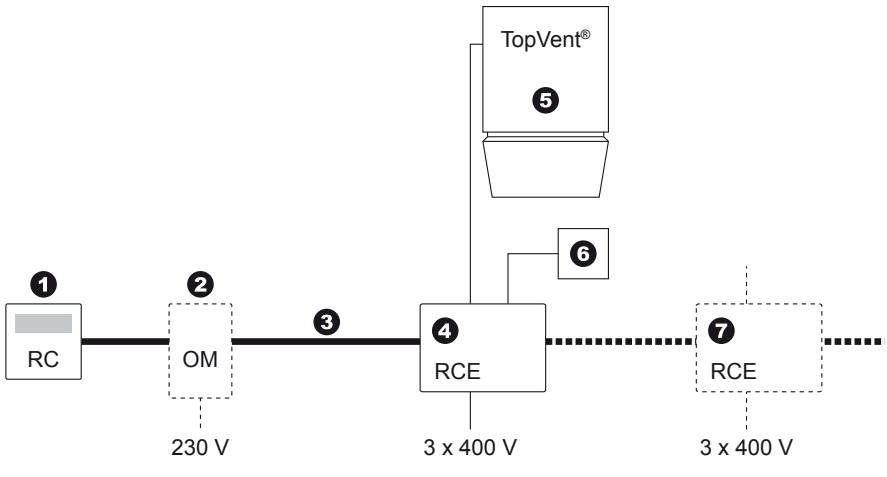
The system structure is illustrated in Fig. L2 and Fig. L3.

Fig. L1: TempTronic RC



❶	TempTronic RC	❻	Mixing valve
❷	Option module	❼	TopVent® unit (pilot unit)
❸	System bus	❽	TopVent® units in parallel operation
❹	RC station with power module	❾	Other RC stations (max. of 8 in total)
❺	Distribution board (on site)		

Fig. L2: Elementary diagram of TempTronic RC with RC station



❶	TempTronic RC
❷	Option module
❸	System bus
❹	RC single station with power module
❺	TopVent® unit
❻	Mixing valve
❼	Other RC single stations (max. of 8 in total)

Fig. L3: Elementary diagram of TempTronic RC with RC single station

Control systems
TempTronic RC

2.3 TempTronic RC

The TempTronic RC fulfils the following functions:

- Regulation of the room temperature
- Control of air distribution by means of the Hoval Air-Injector
- Setting of the fresh air rate (0 -100 %)
- Setting facility for three set point values (room temperature day, room temperature night and frost protection temperature)
- Control of operating modes according to week programme and calendar
- Registration of unit malfunctions in an alarm list
- Providing password protection for user and service personnel
- Menu-guided operator control via a 4-line display and 4 pushbuttons
- Integrated room air sensor

Feed voltage	Low voltage via system bus
Dimensions (W x H x D)	119 x 119 x 28 mm
Ambient temperature	0…50 °C
Type of protection	IP 20

Table L2: Technical specifications of the TempTronic RC

2.4 RC station

The RC station is for the purpose of the power supply and control of several TopVent® units in parallel operation. The following components are installed in a metal enclosure (painted in RAL 7035) for wall mounting:

- Power module
- Terminals for the power supply of the TopVent® units
- Terminals for sensors, actuators and monitoring
- Bus connections for TempTronic RC and other RC stations
- Transformer for power supply of the actuators
- Contactors, fuses

Dimensions (W x H x D)	500 x 300 x 120 mm
Type of protection	IP 65
Switching capacity	6.6 kW
Supply voltage	3 x 400 VAC, 50 Hz

Table L3: Technical data of the RC station

The maximum number of TopVent® units that can be connected to an RC station varies depending on the type of unit (see Table 4).

Unit type	Size	Number
DHV, NHV, MH	6	8
	9	6
	10	4
DKV, CAU, CUM, MK	6	6
	9	4
HV, CUR [1)]	2	10
	3	10
	5	10

[1)] For the connection of more than 10 TopVent® HV or TopVent® curtain units to 1 RC station please contact Hoval's application advisory service.

Table L4: The maximum number of TopVent® units that can be connected to an RC station

2.5 RC single station

The RC single station for power supply and control of a single TopVent® unit. The following power module is installed in a metal enclosure (painted in RAL 7035) for wall mounting.

Dimensions (W x H x D)	200 x 300 x 80 mm
Type of protection	IP 65
Switching capacity	1.65 kW
Supply voltage	3 x 400 VAC, 50 Hz

Table L5: Technical specifications of the RC single station

2.6 System bus

The individual components of the control system are connected on site by way of a system bus.

Cable type	1 pair of conductors, twisted, shielded, category 5 or better
Topology	Line bus
Length	max. 250 m
Capacity	approx. 50 pF/m

Table L6: Specification of the bus cable

2.7 Regulation of the room temperature

TempTronic RC controls the TopVent® units as a function of the heat requirement. In fresh air operating mode the units are constantly in operation; the proportion of fresh air can be regulated (0 – 100 %). In recirculation mode the system operates in the energy-saving on/off mode. However, the control algorithm based on fuzzy logic switches the units according to criteria different from those of the usual 2-point controllers; the control deviations are smaller due to this.

The TempTronic RC system comprises an automatic frost protection switching function:
- If the room temperature drops below frost protection temperature, the units are switched on.
- Once the temperature has risen by 2 °C the units switch off again.

The frost protection temperature can be regulated.

The room temperature sensor is integrated into the TempTronic RC. When positioning the sensor ensure that its readings are not distorted through thermal influences from lamps, machines or other.

2.8 Control of the air distribution

The patented air distributor - the so-called Air-Injector – delivers varying volumes of supply air at different temperatures draught-free to the occupied area of high spaces. This is made possible by the vortex device, by means of which the blow-out direction of the air can be adjusted infinitely variably from vertical to horizontal. It depends on:
- the mounting height
- the air flow rate (→ fan speed)
- the temperature difference between supply air and room air

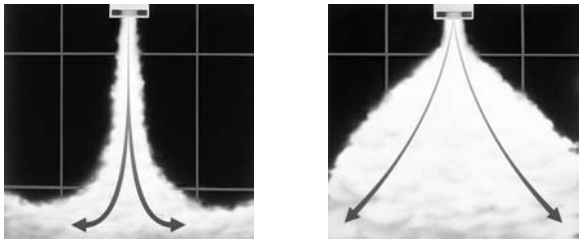
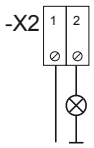
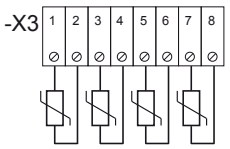
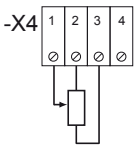
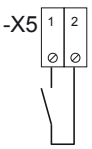
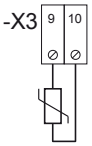
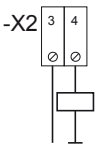
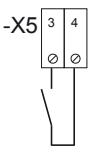


Fig. L4: Air distribution with the Hoval Air-Injector

In certain cases the Air-Injector can be set to a fixed value when commissioning takes place. For TempTronic RC to adapt automatically the delivery direction of the air to changing operating conditions an actuator is required:
- Optional: actuator for Air-Injector VT-AS

2.9 External connections

By means of an optional module, the following additional functions can be controlled:
- Option: Option module OM

Collective trouble indicator In case of a malfunction a collective alarm can be displayed by means of a volt-free contact.	
Room temperature average value Instead of the integrated room air sensor, 4 sensors can be installed for calculation of the mean value in the occupied area.	
Fresh air rate The proportion of fresh air can be controlled externally.	
External switching The units can be switched externally via a potential-free contact (e.g. from a control centre) to the operating mode 'Off'.	
External room temperature sensor Instead of the room temperature sensor that is integrated into the TempTronic RC an external sensor can be connected.	
Switching of the distributor pump Depending on the heat or cold requirement the distributor pump can be switched via a potential-free contact.	
Door contact for control of a TopVent® curtain overdoor air curtain via a potential-free contact	

Dimensions (W x H x D)	110 x 155 x 50 mm
Type of protection	IP 20
Ambient temperature	0…50 °C
Supply voltage	1 x 230 VAC, 50 Hz

Table L7: Technical data of the optional module

2.10 Alarms and monitoring

The system monitors itself. All the alarms are registered in the alarm list and displayed by TempTronic RC.

Alarm	Cause	System reaction	Remedy
Condensate pump	A condensate pump is defective.	All connected units switch to the operating mode 'Off'.	Call Hoval customer service.
Fan	A fan motor has overheated.	All connected units switch to the operating mode 'Off'.	Call Hoval customer service.
Isolation	The isolation switch on a unit has been in the 'Off' position for more than 30 minutes.	–	Switch the isolation switch to the 'On' position.
Supply air sensor	The supply air temperature sensor in the pilot unit is defective.	● The TempTronic RC continues to work with a supply air temperature of 20 °C until the error is corrected. ● The fresh air damper closes (on TopVent® MH, MK, CAU). ● The supply air is blown into the room horizontally.	Call Hoval customer service.
Filter	The set pressure difference for the filter monitor was exceeded for more than 5 minutes.	–	Change the filter.
Fresh air damper	The fresh air/recirculation air damper is jammed or its actuator is defective.	All connected units switch to the operating mode 'Off'.	Call Hoval customer service.
Frost	The temperature has fallen to below 5 °C after the heating coil.	● All connected units switch to the operating mode 'Off'. ● The distributor pump switches on. ● The heating mixing valve opens.	

3 EasyTronic

The EasyTronic is a switching device with a simple temperature control for TopVent® DHV, NHV and HV.

3.1 Construction

The EasyTronic consists of:

- the switching device (with operating mode control button) built into a plastic enclosure for wall-mounted installation,
- the room thermostat
  This must be installed in the occupied area and must be connected to the switching device.

Feed voltage	3 x 400 VAC ±10 %
Frequency	50…60 Hz
Series fuse	10 A
Switching capacity	max. 4 kW
Type of protection	IP 54
Dimensions (W x H x D)	166 x 230 x 129 mm
Ambient temperature	5…40 °C

Table L8: Technical data of the switching device

Dimensions (W x H x D)	74 x 74 x 23 mm
Measurement area	5…30 °C
Type of protection	IP 30

Table L9: Technical data of the room thermostat

3.2 Temperature control

The EasyTronic switches the connected TopVent® units depending on the heat requirement. The desired operating mode can be selected manually via the switching device:

0____ The TopVent® units are switched off.
1____ On/Off operation of the TopVent® units at level 1 (= low fan speed)
2____ On/Off operation of the TopVent® units at level 2 (= high fan speed)

The desired temperature is set on the room thermostat by means of the control knob. If the room temperature drops below the setpoint value, the TopVent® units switch on at the preselected level. Upon reaching the setpoint value the units switch off again.

The EasyTronic does not have a signal for switching a heating pump or heat generator.

3.3 Frost protection switch:

The EasyTronic is manually switched to frost protection mode: set the operating mode control button to '1' or '2' and set the reduced temperature (e.g. 5 °C) on the room thermostat.

3.4 Fault

When the thermal contacts trigger the EasyTronic switches off. To restart after the motor has cooled down, set the operating mode control button to '0' and then back to the desired operating mode (or briefly disconnect the power supply).

3.5 Installation

The power supply and connection of the TopVent® units must be performed in accordance with terminal diagram and in accordance with the valid regulations.

Several TopVent® units can be controlled by one EasyTronic. Only units that are working under the same operating conditions can be combined to form a group.

Wire the thermal contacts in series!

Fig. L5: EasyTronic switching device

Fig. L6: EasyTronic room thermostat

4 Manual control of the air distribution

The following components are available for manual control of the air distribution:

4.1 Potentiometer

The air outlet direction can be adjusted manually:
0 % __ vertical air outlet
100 % __ horizontal air outlet
A maximum of 7 air distributors can be controlled at a time by means of the potentiometer. 2 versions are available:

- Potentiometer wall unit (PMS-W)
- Potentiometer for control box (PMS-S)

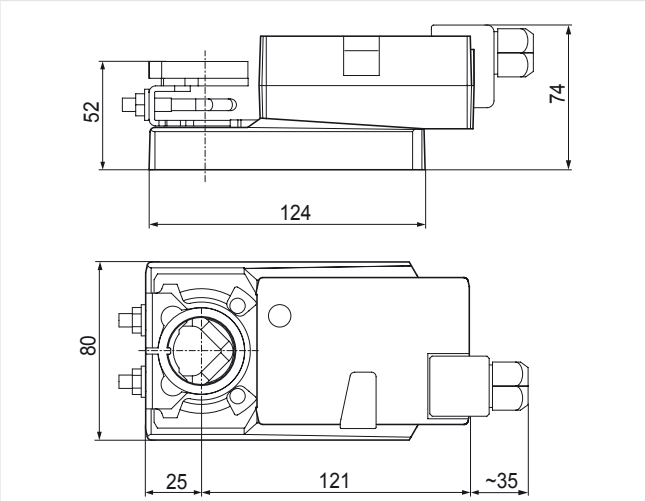
Fig. L7: Potentiometer PMS-W

Type	PMS-W	PMS-S
Feed voltage	AC 24 V, 50 Hz	AC 24 V, 50 Hz
Actuating signal Y	DC 2…10 V	DC 2…10 V
Setting range	0 %…100 %	0 %…100 %
Connection	Terminals 1.5 mm²	Terminals 1.5 mm²
Dimensions	84 x 84 x 60 mm	48 x 48 mm

Table L10: Technical data of the potentiometer PMS-W (wall unit) and of the potentiometer PMS-S (for control box)

4.2 Actuator

The actuator adjusts the guide vanes of the Air-Injector within an angular range of 0° (= vertical air outlet) to 50° (= horizontal air outlet).



Rated voltage	AC 24 V, 50 Hz
Actuating signal Y	DC 0…10 V
Operating range	DC 2…10 V
Torque	10 Nm
Runtime	150 s

Table L11: Dimensions and technical data of the actuator VT-AS

4.3 Transformer

A transformer is available for low voltage supply. It is built into a plastic enclosure with 2 screwed connectors and is mounted on the wall.
A maximum of 7 actuators can be connected at a time to the transformer.

Feed voltage	AC 230/24 V
Power consumption	10 VA
Built-in fine-wire fuse	0.5 A
Dimensions	130 x 75 x 80 mm
Use	Indoors
Temperature range	-25…70 °C
Ambient humidity	10…95 % rh

Table L12: Technical data of the transformer

Operation

1 Operation

1.1 Start-up

Initial start-up may be performed only by skilled personnel! An unauthorized initial start-up can cause damage.

- Check the units and the installation work optically for any damage or defects.
- Check the circuit diagrams and wiring diagrams for completeness.
- Set the room temperature controller with the aid of the operating instructions.
- Optically check the direction of rotation of the fans at both rotational speeds. The correct direction of rotation is indicated by an arrow on the nozzle. Alter the wiring, if necessary.
- Measure the current consumption and compare it with the specification on the type plate.
- Check the operability of the units and closed-loop control system by adjusting the set points and operating times.
- Set the Air-Injector (if there is one) to suit the mounting height and the air flow rate (see Section L5 'Control of the Air Distribution').
- Check the room temperature sensor:
  - Is the sensor mounted in a representative place?
  - Will the temperature acquisition be falsified by machinery and suchlike?

1.2 Operation

The system may be operated only be trained personnel! On this subject please see the operating instructions for the control system used.

Normally the system runs fully automatically depending on the operating times and temperature conditions. Correct functioning should be checked periodically. Changes to the operating times must be corrected appropriately in the controller.
Free air passage must be ensured and the air jet must be able to spread unhindered. No heat accumulation is allowed to take place.

1.3 Decommissioning

- Switch the main switch and, where applicable, the isolation switch (optional) to the Off position.
- If there is a danger of freezing, drain the system or render it appropriately frostproof with an antifreeze agent.

2 Servicing

Servicing and cleaning work may be performed by skilled personnel only! Observe the accident prevention regulations! Before performing any work on the unit: switch and the main switch and, where applicable, the isolation switch to the Off position and secure them! Wait until the fan has stopped!

Every 2 - 4 months
- Check, clean or change the filter (if there is one).

Annually before commencing the heating season
- Check the fan for correct functioning.
- Check the unit optically. Check the operability of the Air-Injector and watch out for any contamination on the fan's impellers. If dirty, clean them.
- Check the control system.

Every 2 years
- Optically check the heating coil and clean it as necessary.

3 Repairs

Repair work must be performed by trained skilled personnel only, because it requires special expertise. This knowledge is not imparted in these operating instructions.

Spare parts must comply with the technical requirements of the manufacturer of the system! Use only genuine Hoval spare parts.
If required, please call out our customer service department.

4 Waste disposal

When disposing of any components of TopVent® units, please observe the following:
- Recycle metal components.
- Recycle plastic parts.
- Dispose of electric and electronic parts via hazardous waste.

TopVent® Design handbook
Subject to technical alterations.
Art.Nr. 4209245 – Edition 01/2012

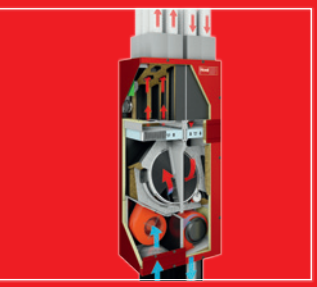
Hoval

Responsibility for energy and environment

The Hoval brand is internationally known as one of the leading suppliers of indoor climate control solutions. More than 65 years of experience have given us the necessary capabilities and motivation to continuously develop exceptional solutions and technically advanced equipment. Maximising energy efficiency and thus protecting the environment are both our commitment and our incentive. Hoval has established itself as an expert provider of intelligent heating and ventilation systems that are exported to over 50 countries worldwide.

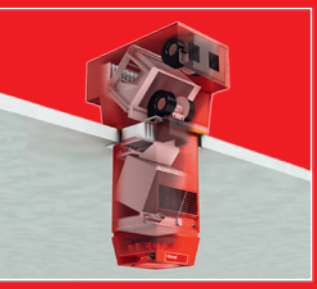
Hoval heating technology

As an energy-neutral supplier with a full range of products, Hoval helps its customers to select innovative system solutions for a wide range of energy sources, such as heat pumps, biomass, solar energy, gas, oil and district heating. Services range from private residential units to large-scale industrial projects.



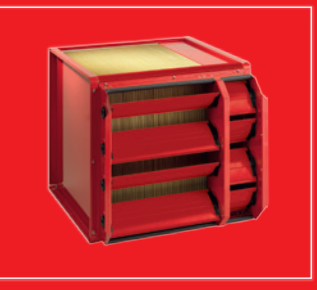
Hoval residential ventilation

Increased comfort and more efficient use of energy from private housing to industrial halls: our controlled residential ventilation products provide fresh, clean air for living and working space. Our innovative system for a healthy room climate uses heat and moisture recovery, while at the same time protecting energy resources and providing a healthier environment.



Hoval indoor climate systems

Indoor climate systems ensure top air quality and economical usability. Hoval has been installing decentralised systems for many years. The key is combinations of multiple – and different – air-conditioners that can be separately controlled and also controlled together as a single system. This enables Hoval to respond flexibly to a wide range of requirements for heating, cooling and ventilation.



Hoval heat recovery

Efficient use of energy due to heat recovery. Hoval offers two different solutions: plate heat exchangers as a recuperative system and rotary heat exchangers as a regenerative system.

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