Hoval Indoor Climate Systems

TopVent®

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

TopVent® TH | TC | THC | MH | MC | MHC

Design Handbook
Indoor climate systems
Efficient. Flexible. Reliable.

**TopVent® TH**
Recirculation units for heating spaces up to 25 m in height with central heat supply

**TopVent® TC**
Recirculation units for heating and cooling spaces up to 25 m in height with central heat and cold supply (2-pipe-system)

**TopVent® THC**
Recirculation units for heating and cooling spaces up to 25 m in height with central heat and cold supply (4-pipe-system)

**TopVent® MH**
Supply air units for ventilating and heating spaces up to 25 m in height with central heat supply

**TopVent® MC**
Supply air units for ventilating, heating and cooling spaces up to 25 m in height with central heat and cold supply (2-pipe-system)

**TopVent® MHC**
Supply air units for ventilating, heating and cooling spaces up to 25 m in height with central heat and cold supply (4-pipe-system)

Options

Transport and installation

System design

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

Diverse range of units ensures flexibility

Different types of ventilation units can be combined to create the perfect system for the project in question:
- RoofVent® supply and extract air handling units
- TopVent® supply air units
- TopVent® recirculation units

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

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

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

Draught-free air distribution

A key feature of Hoval indoor climate units is the patented vortex air distributor, known as the Air-Injector. It is controlled automatically and changes the blowing angle of the air continuously between vertical and horizontal. The highly efficient air supply system has many advantages:
- It provides a high level of comfort during heating and cooling. No draughts develop in the hall.
- The efficient and even air distribution ensures that the indoor climate units cover a large area.
- The Air-Injector keeps the temperature stratification in the room low, thus minimising heat loss through the roof.

Control with specialist expertise

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

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

Competent and reliable

Hoval will support you and provide expert knowledge throughout all project phases. You can rely on comprehensive technical advice when it comes to planning Hoval indoor climate systems and on the skills of the Hoval technicians during the installation, commissioning and maintenance of the system.
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TopVent® TH
Recirculation units for heating spaces up to 25 m in height with central heat supply

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2 Construction and operation ................................................................. 8
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1 Use

1.1 Intended use

TopVent® TH units are recirculation units for heating spaces up to 25 m in height with central heat supply. They have the following functions:
- Heating (with connection to a hot water supply)
- Recirculation operation
- Air distribution with adjustable Air-Injector
- Air filtration (option)

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

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

1.2 User group

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

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

2 Construction and operation

2.1 Structure

The TopVent® TH unit consists of the following components:
- Fan unit:
  Axial fan with energy-saving EC motor, maintenance-free and infinitely variable
- Heating section:
  contains the heating coil for heating the supply air with hot water
- Air-Injector:
  Patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area

As part of the TopTronic® C control system, the unit control box is an integral component. The following components are installed:
- Unit controller: this component controls the unit including the air distribution according to the specifications of the control zone. The unit controller is connected to the other components of the TopTronic® C control system via system bus.
- Main switch
- Circuit board with electrical components and external connections

All unit components are fully factory-wired.

Fig. B1: TopVent® TH components
2.2 Function diagram

Fig. B2: TopVent® TH structure

Fig. B3: TopVent® TH function diagram
2.3 Operating modes

The TopVent® TH has the following operating modes:

■ Recirculation
■ Recirculation speed 1
■ Standby

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

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Operating mode</th>
<th>Description</th>
</tr>
</thead>
</table>
| REC  | Recirculation  | Fan .................. speed 1/2 1)  
           |                | Heating ................ on  
           |                | 1) Depending on heat demand  
| DES  | Destratification:  | Fan .................. speed 2  
            |                  | Heating ................ off  
| REC1 | Recirculation speed 1 | Fan .................. speed 1 1)  
           |                | Heating ................ on  
           |                | 1) Depending on heat demand  
| DES  | Destratification:  | Fan .................. speed 1  
            |                  | Heating ................ off  
| ST   | Standby         | Fan .................. off  
           |                | Heating ................ off  
| CPR  | Cooling protection:  | Fan .................. speed 2  
            |                  | Heating ................ on  
| L_OFF| Off (local operating mode) | Fan .................. off  
           |                | Heating ................ off  
|     | Forced heating  | Fan .................. speed 2  
           |                | Heating ................ on  

Table B4: TopVent® TH operating modes
3 Technical data

3.1 Unit type reference

Unit type
TopVent® TH

Unit size
6 or 9

Heating section
A with coil type A
B with coil type B
C with coil type C

Further options

| Table B5: Unit type reference TopVent® TH |

3.2 Application limits

<table>
<thead>
<tr>
<th>Extract air temperature</th>
<th>max. °C</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply air temperature</td>
<td>max. °C</td>
<td>60</td>
</tr>
<tr>
<td>Temperature of the heating medium 1)</td>
<td>max. °C</td>
<td>90</td>
</tr>
<tr>
<td>Pressure of the heating medium</td>
<td>max. kPa</td>
<td>800</td>
</tr>
</tbody>
</table>

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

1) Design for higher temperatures on request.

| Table B6: TopVent® TH application limits |

3.3 Electrical connection

<table>
<thead>
<tr>
<th>Unit type</th>
<th>TH-6</th>
<th>TH-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>V AC</td>
<td>3 × 400</td>
</tr>
<tr>
<td>Permitted voltage tolerance</td>
<td>%</td>
<td>± 5</td>
</tr>
<tr>
<td>Frequency</td>
<td>Hz</td>
<td>50</td>
</tr>
<tr>
<td>Connected load</td>
<td>kW</td>
<td>1.5</td>
</tr>
<tr>
<td>Current consumption max.</td>
<td>A</td>
<td>2.9</td>
</tr>
<tr>
<td>Series fuse</td>
<td>A</td>
<td>13</td>
</tr>
<tr>
<td>Protection rating</td>
<td>-</td>
<td>IP 54</td>
</tr>
</tbody>
</table>

| Table B7: TopVent® TH electrical connections |

3.4 Flow rate, product parameters

<table>
<thead>
<tr>
<th>Unit type</th>
<th>TH-6</th>
<th>TH-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil type</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Nominal air flow rate</td>
<td>m³/h</td>
<td>6000</td>
</tr>
<tr>
<td>Floor area covered</td>
<td>m²</td>
<td>537</td>
</tr>
<tr>
<td>Static efficiency of the fans</td>
<td>%</td>
<td>48.5</td>
</tr>
<tr>
<td>Effective electric power input</td>
<td>kW</td>
<td>0.46</td>
</tr>
</tbody>
</table>

| Table B8: TopVent® TH technical data |
### 3.5 Heat output

<table>
<thead>
<tr>
<th>Heating medium temperature</th>
<th>80/60 °C</th>
<th>60/40 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>Type</td>
<td>t&lt;sub&gt;room&lt;/sub&gt;</td>
</tr>
<tr>
<td>-----</td>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td>°C</td>
<td>kW/m³</td>
</tr>
<tr>
<td>TH-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>16</td>
<td>32.8</td>
</tr>
<tr>
<td>B</td>
<td>20</td>
<td>30.3</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>43.4</td>
</tr>
<tr>
<td>TH-9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>16</td>
<td>76.0</td>
</tr>
<tr>
<td>B</td>
<td>20</td>
<td>70.3</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>51.2</td>
</tr>
</tbody>
</table>

**Legend:**
- Type = Type of coil
- t<sub>room</sub> = Room air temperature
- Q = Heat output
- H<sub>max</sub> = Maximum mounting height
- t<sub>S</sub> = Supply air temperature
- Δp<sub>W</sub> = Water pressure drop
- m<sub>W</sub> = Water quantity

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

Table B9: TopVent® TH heat outputs

### 3.6 Sound data

<table>
<thead>
<tr>
<th>Unit type</th>
<th>TH-6C</th>
<th>TH-9C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound pressure level (at a distance of 5 m)</td>
<td>dB(A)</td>
<td>55</td>
</tr>
<tr>
<td>Total sound power level</td>
<td>dB(A)</td>
<td>77</td>
</tr>
</tbody>
</table>

**Octave sound power level**
- 63 Hz | dB | 55 | 61 |
- 125 Hz | dB | 60 | 65 |
- 250 Hz | dB | 65 | 69 |
- 500 Hz | dB | 70 | 73 |
- 1000 Hz | dB | 74 | 75 |
- 2000 Hz | dB | 70 | 75 |
- 4000 Hz | dB | 64 | 70 |
- 8000 Hz | dB | 56 | 63 |

<sup>1)</sup> with a hemispherical radiation pattern in a low-reflection room

Table B10: TopVent® TH sound power levels
3.7 Dimensions and weights

![TopVent® TH dimensional drawing](image)

**Fig. B11: TopVent® TH dimensional drawing**

**Table B12: TopVent® TH dimensions and weights**

<table>
<thead>
<tr>
<th>Unit size</th>
<th>TH-6</th>
<th>TH-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil type</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>A</td>
<td>mm</td>
<td>900</td>
</tr>
<tr>
<td>B</td>
<td>mm</td>
<td>905</td>
</tr>
<tr>
<td>C</td>
<td>mm</td>
<td>415</td>
</tr>
<tr>
<td>E</td>
<td>mm</td>
<td>594</td>
</tr>
<tr>
<td>F</td>
<td>mm</td>
<td>758</td>
</tr>
<tr>
<td>G</td>
<td>mm</td>
<td>322</td>
</tr>
<tr>
<td>H</td>
<td>mm</td>
<td>244</td>
</tr>
<tr>
<td>I</td>
<td>mm</td>
<td>760</td>
</tr>
<tr>
<td>K</td>
<td>mm</td>
<td>1030</td>
</tr>
<tr>
<td>R</td>
<td>mm</td>
<td>977</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>J</th>
<th>&quot;</th>
<th>Rp 1¼ (internal)</th>
<th>Rp 1½ (internal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water content of heating coil</td>
<td>l</td>
<td>4.6</td>
<td>4.6</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>104</td>
<td>104</td>
</tr>
</tbody>
</table>

1 Return heating  
2 Flow heating
4 Specification texts

4.1 TopVent® TH

Recirculation unit for heating rooms up to 25 m in height with central heat supply; equipped with highly efficient air distributor; maximum floor area reached per unit 537 m² (size 6) and 946 m² respectively (size 9).

The unit consists of the following components:
- Fan unit
- Heating section
- Air-Injector or outlet nozzle
- Unit control box or terminal box
- Optional components

TopVent® TH units comply with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of energy-related products. They are systems of the 'fan coil unit' type.

Fan unit

Consisting of maintenance-free, direct-drive axial fan with high-efficiency EC motor and balanced rotating wheel with aerodynamically shaped blades and serrated trailing edge (integrated in the heating section).

Heating section

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials.

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

Air-Injector

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, with:
- Vortex air distributor with concentric outlet nozzle, adjustable vanes and integrated absorber hood
- Actuator for infinitely variable adjustment of the air distribution from vertical to horizontal for draught-free air distribution in the hall under changing operating conditions
- Supply air temperature sensor

Outlet nozzle (variant)

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials. Concentric outlet nozzle with a supply air sensor.

Unit control box

Control box fitted at the side of the housing for connection of the power supply and housing the control components that facilitate energy-optimised operation, controlled by the control system TopTronic® C. Plastic housing, protection rating IP 56. The following components are installed:
- Main switch
- Circuit board with all required electrical components, unit controller (clipped on) as well as connection terminals for the following external connections:
  - Heating valve
  - Heating pump
  - Return temperature sensor
  - Door contact

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

Power supply and bus connection to be installed on site.

Terminal box (variant)

Terminal box fitted at the side of the housing for connection of the power supply and peripheral components of the unit. Plastic housing, protection rating IP 56. The following components are installed:
- Main switch
- Circuit board with all required electrical components as well as connection terminals for the following signals:
  - Input Enable fan
  - Input Control signal fan
  - Output Control signal next fan
  - Input Control signal actuator Air-Injector
  - Output Control signal next actuator Air-Injector
  - Output Feedback control signal Air-Injector
  - Output Error
- The following sensors and actuators in the unit are factory-wired:
  - Fan
  - Supply air temperature sensor
  - Actuator Air-Injector
Options for the unit

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

Filter box:
Housing made of aluzinc sheet with 2 ISO coarse 60% bag filters (G4), with differential pressure switch for filter monitoring, factory-wired to the circuit board in the unit control box.

Flat filter box:
Housing made of aluzinc sheet with 4 pleated ISO coarse 60% cell filters (G4), with differential pressure switch for filter monitoring, factory-wired to the circuit board in the unit control box.

Standard paint finish:
External paint finish in Hoval red (RAL 3000)

Paint finish as desired:
Choice of external paint finish in RAL colour

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

Acoustic cowl:
consisting of an absorber hood of large volume, insertion attenuation 4 dB(A)

Hydraulic assembly diverting system:
Prefabricated assembly for hydraulic diverting system, consisting of mixing valve, regulating valve, ball valve, automatic air vent and screw connections for connection to the unit and to the distributor circuit; mixing valve with plug-in connection, sized for the coil in the unit and the Hoval TopTronic® C control system.

Mixing valve:
Mixing valve with modulating rotary actuator and plug-in connection, sized for the coil in the unit.

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

Return temperature sensor:
Temperature sensor for monitoring the heating medium.

4.2 TopTronic® C – System control

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

The control system is customised and preconfigured ex works. Zone allocation:

- Zone 1: __ x Unit type __________________
- Zone 2: __ x Unit type __________________
- Zone 3: __ x Unit type __________________
- …

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

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

Control functions:
- Control of the supply air temperature using room supply air cascade control via sequential control of the energy recovery and the coils (depending on the unit type)
- Demand-driven control of the room air quality by variation of the supply air and exhaust air volume flows with minimum and maximum limit (for supply and extract air handling units, optional)
- Control of the unit including the air distribution according to the specifications of the zone controller
Alarms, protection:
- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms; forwarding via e-mail can be set in the parameters.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (for supply air units as well as supply and extract air handling units)
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

Options for the zone control panel:
- Design for heating (TH, TC, THC, MH, MC, MHC)
- Design for cooling (TC, THC, MC, MHC)
- Cooling lock switch (TC, THC, MC, MHC)
- Alarm lamp
- Socket
- Additional room air temperature sensors (max. 3)
- Combination sensor room air quality, temperature and humidity
- External sensor values
- External set values
- Load shedding input
- Operating selector switch on terminal
- Operating selector button on terminal
- Power supply for air handling unit
- Safety relay
- Control of distributor pump, incl. power supply

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

System structure:
- Unit controller: installed in the particular indoor climate unit
- Zone bus: as serial connection of all unit controllers with the zone controller; with robust bus protocol via shielded and twisted-pair bus line (bus cables provided by the client)
- Zone control panel, designed as compact cabinet for wall installation, made of coated sheet steel (light grey RAL 7035), with:
  - Zone controller with operating panel, making it simple to operate and monitor the system
  - Fresh air temperature sensor
  - Room temperature sensor
- Circuit board with external connections for:
  - Collective alarm
  - Forced off (zone controller)
  - Forced off (supply air unit)
  - Heating demand
  - Setpoint heating demand
  - Fault heat supply
  - Cooling demand
  - Fault cold supply
  - External enabling heating/cooling
  - External setting heating/cooling
  - Changeover valves heating/cooling
  - Additional room air temperature sensors (max. 3)
  - External setpoint fresh air ratio
  - Operating selector switch on terminal (digital)
  - Operating selector button on terminal

Control functions:
- Control of the supply air temperature via sequential control of the coils
- Control of the unit including the air distribution according to the specifications of the zone controller

Alarms, protection:
- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (for supply air units)
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

Options for the zone control panel:
- Additional room air temperature sensors (max. 3)
- Operating of the units via building management system via standardised interfaces:
  - BACnet
  - Modbus IP
  - Modbus RTU

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

Room temperature sensor ET-R for connection to the EasyTronic EC in place of the room temperature sensor that is integrated in the room temperature controller, in a plastic housing for wall-mounted installation, protection rating IP 65.
TopVent® TC
Recirculation units for heating and cooling spaces up to 25 m in height with central heat and cold supply (2-pipe-system)

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2 Construction and operation ................................................................. 18
3 Technical data ...................................................................................... 21
4 Specification texts ............................................................................... 25
1 Use

1.1 Intended use

TopVent® TC units are recirculation units for heating and cooling spaces up to 25 m in height with central heat and cold supply. They have the following functions:

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

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

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

1.2 User group

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

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

2 Construction and operation

2.1 Structure

The TopVent® TC unit consists of the following components:

- Fan unit: Diagonal fan with energy-saving EC motor, maintenance-free and infinitely variable
- Heating/cooling section: contains the heating/cooling coil for heating and cooling the supply air with hot water or cold water and the condensate separator for the condensate generated
- Air-Injector: Patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area

As part of the TopTronic® C control system, the unit control box is an integral component. The following components are installed:

- Unit controller: this component controls the unit including the air distribution according to the specifications of the control zone. The unit controller is connected to the other components of the TopTronic® C control system via system bus.
- Main switch
- Circuit board with electrical components and external connections

All unit components are fully factory-wired.

Fig. C1: TopVent® TC components
2.2 Function diagram

- Extract air
- Air filter with differential pressure switch (option)
- Heating/cooling coil
- Condensate separator
- Fan
- Air-Injector with actuator
- Supply air temperature sensor
- Supply air

Fig. C2: TopVent® TC structure

Fig. C3: TopVent® TC function diagram
2.3 Operating modes

The TopVent® TC has the following operating modes:
- Recirculation
- Recirculation speed 1
- Standby

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

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

Table C4: TopVent® TC operating modes
3 Technical data

3.1 Unit type reference

Unit type
TopVent® TC

Unit size
6 or 9

Heating/cooling section
C with coil type C
D with coil type D

Further options

Table C5: Unit type reference TopVent® TC

3.2 Application limits

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit type</th>
<th>TC-6</th>
<th>TC-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extract air temperature max. °C</td>
<td></td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Supply air temperature max. °C</td>
<td></td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Temperature of the heating medium 1) max. °C</td>
<td></td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Pressure of the heating medium max. kPa</td>
<td></td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>Air flow rate Size 6: min. m³/h</td>
<td></td>
<td>3100</td>
<td>5000</td>
</tr>
<tr>
<td>Condensate quantity Size 6: max. kg/h</td>
<td></td>
<td>90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Size 9: max. kg/h</td>
<td>150</td>
<td></td>
</tr>
</tbody>
</table>

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

1) Design for higher temperatures on request

Table C6: TopVent® TC application limits

3.3 Electrical connection

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit type</th>
<th>TC-6</th>
<th>TC-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage V AC</td>
<td></td>
<td>3 x 400</td>
<td>3 x 400</td>
</tr>
<tr>
<td>Permitted voltage tolerance %</td>
<td></td>
<td>± 5</td>
<td>± 5</td>
</tr>
<tr>
<td>Frequency Hz</td>
<td></td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Connected load kW</td>
<td></td>
<td>3.6</td>
<td>3.6</td>
</tr>
<tr>
<td>Current consumption max. A</td>
<td></td>
<td>5.9</td>
<td>5.9</td>
</tr>
<tr>
<td>Series fuse A</td>
<td></td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Protection rating -</td>
<td></td>
<td>IP 54</td>
<td>IP 54</td>
</tr>
</tbody>
</table>

Table C7: TopVent® TC electrical connections

3.4 Flow rate, product parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit type</th>
<th>TC-6</th>
<th>TC-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal air flow rate m³/h</td>
<td>C</td>
<td>6000</td>
<td>9000</td>
</tr>
<tr>
<td>Floor area covered m²</td>
<td></td>
<td>537</td>
<td>946</td>
</tr>
<tr>
<td>Static efficiency of the fans %</td>
<td></td>
<td>63.6</td>
<td>63.3</td>
</tr>
<tr>
<td>Effective electric power input kW</td>
<td></td>
<td>0.67</td>
<td>1.23</td>
</tr>
</tbody>
</table>

Table C8: TopVent® TC technical data
### 3.5 Heat output

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>t\textsubscript{room}</th>
<th>Q\textsubscript{Hmax}</th>
<th>t\textsubscript{s}</th>
<th>Δp\textsubscript{W}</th>
<th>m\textsubscript{W}</th>
<th>Q\textsubscript{Hmax}</th>
<th>t\textsubscript{s}</th>
<th>Δp\textsubscript{W}</th>
<th>m\textsubscript{W}</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC-6</td>
<td>C</td>
<td>16</td>
<td>76.0</td>
<td>9.4</td>
<td>55.6</td>
<td>18</td>
<td>3267</td>
<td>45.0</td>
<td>11.8</td>
<td>40.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>70.3</td>
<td>9.8</td>
<td>56.8</td>
<td>16</td>
<td>3022</td>
<td>39.3</td>
<td>12.5</td>
<td>41.5</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>16</td>
<td>117.9</td>
<td>9.8</td>
<td>56.9</td>
<td>18</td>
<td>5066</td>
<td>69.9</td>
<td>12.3</td>
<td>41.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>109.1</td>
<td>10.2</td>
<td>58.0</td>
<td>15</td>
<td>4686</td>
<td>61.0</td>
<td>13.1</td>
<td>42.1</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>16</td>
<td>140.7</td>
<td>9.1</td>
<td>64.4</td>
<td>15</td>
<td>6045</td>
<td>85.4</td>
<td>11.3</td>
<td>46.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>130.4</td>
<td>9.5</td>
<td>65.0</td>
<td>13</td>
<td>5600</td>
<td>75.1</td>
<td>12.0</td>
<td>46.8</td>
</tr>
</tbody>
</table>

#### Legend:
- Type = Type of coil
- t\textsubscript{room} = Room air temperature
- Q\textsubscript{Hmax} = Heat output
- t\textsubscript{s} = Supply air temperature
- Δp\textsubscript{W} = Water pressure drop
- m\textsubscript{W} = Water quantity

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

### Table C9: TopVent® TC heat outputs

### 3.6 Cooling capacities

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>t\textsubscript{room}</th>
<th>RH\textsubscript{room}</th>
<th>Q\textsubscript{sen}</th>
<th>Q\textsubscript{tot}</th>
<th>t\textsubscript{s}</th>
<th>Δp\textsubscript{W}</th>
<th>m\textsubscript{w}</th>
<th>m\textsubscript{C}</th>
<th>Q\textsubscript{sen}</th>
<th>Q\textsubscript{tot}</th>
<th>t\textsubscript{s}</th>
<th>Δp\textsubscript{W}</th>
<th>m\textsubscript{w}</th>
<th>m\textsubscript{C}</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TC-6</td>
<td>C</td>
<td>22</td>
<td>50</td>
<td>20.4</td>
<td>20.4</td>
<td>13.9</td>
<td>15</td>
<td>2925</td>
<td>0.0</td>
<td>18.0</td>
<td>18.0</td>
<td>15.1</td>
<td>12</td>
<td>2573</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>70</td>
<td>18.5</td>
<td>27.7</td>
<td>14.9</td>
<td>28</td>
<td>3960</td>
<td>13.5</td>
<td>16.0</td>
<td>21.4</td>
<td>16.1</td>
<td>17</td>
<td>3064</td>
<td>7.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>22</td>
<td>50</td>
<td>25.2</td>
<td>31.1</td>
<td>15.5</td>
<td>36</td>
<td>4448</td>
<td>8.6</td>
<td>22.7</td>
<td>24.8</td>
<td>16.7</td>
<td>23</td>
<td>3552</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>70</td>
<td>23.2</td>
<td>43.7</td>
<td>16.5</td>
<td>71</td>
<td>6263</td>
<td>30.2</td>
<td>20.8</td>
<td>37.5</td>
<td>17.7</td>
<td>52</td>
<td>5367</td>
<td>24.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>22</td>
<td>50</td>
<td>31.4</td>
<td>31.4</td>
<td>13.6</td>
<td>15</td>
<td>4496</td>
<td>0.0</td>
<td>27.6</td>
<td>27.6</td>
<td>14.9</td>
<td>12</td>
<td>3947</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>70</td>
<td>28.4</td>
<td>44.7</td>
<td>14.6</td>
<td>31</td>
<td>6401</td>
<td>23.9</td>
<td>24.6</td>
<td>28.2</td>
<td>15.9</td>
<td>12</td>
<td>4031</td>
<td>5.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>22</td>
<td>50</td>
<td>38.8</td>
<td>49.9</td>
<td>15.2</td>
<td>38</td>
<td>7149</td>
<td>16.3</td>
<td>35.0</td>
<td>35.0</td>
<td>16.4</td>
<td>19</td>
<td>5013</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>70</td>
<td>35.9</td>
<td>69.8</td>
<td>16.2</td>
<td>75</td>
<td>9989</td>
<td>49.8</td>
<td>32.0</td>
<td>53.2</td>
<td>17.4</td>
<td>44</td>
<td>7619</td>
<td>31.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>22</td>
<td>50</td>
<td>37.1</td>
<td>37.1</td>
<td>11.8</td>
<td>13</td>
<td>5307</td>
<td>0.0</td>
<td>32.2</td>
<td>32.2</td>
<td>13.4</td>
<td>10</td>
<td>4613</td>
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<td></td>
<td></td>
<td>70</td>
<td>34.6</td>
<td>56.7</td>
<td>12.6</td>
<td>30</td>
<td>8118</td>
<td>32.5</td>
<td>29.7</td>
<td>45.1</td>
<td>14.2</td>
<td>19</td>
<td>6459</td>
<td>22.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>22</td>
<td>50</td>
<td>46.4</td>
<td>62.4</td>
<td>12.7</td>
<td>36</td>
<td>8941</td>
<td>23.5</td>
<td>41.6</td>
<td>50.9</td>
<td>14.3</td>
<td>24</td>
<td>7282</td>
<td>13.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>70</td>
<td>43.9</td>
<td>87.4</td>
<td>13.5</td>
<td>70</td>
<td>12513</td>
<td>63.9</td>
<td>39.1</td>
<td>75.8</td>
<td>15.1</td>
<td>53</td>
<td>10854</td>
<td>54.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Legend:
- Type = Type of coil
- t\textsubscript{room} = Room air temperature
- RH\textsubscript{room} = Relative humidity of the room air
- Q\textsubscript{sen} = Sensible cooling capacity
- Q\textsubscript{tot} = Total cooling capacity
- t\textsubscript{s} = Supply air temperature
- Δp\textsubscript{W} = Water pressure drop
- m\textsubscript{w} = Water quantity
- m\textsubscript{C} = Condensate quantity

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

Table C10: TopVent® TC cooling capacities
3.7 Sound data

<table>
<thead>
<tr>
<th>Unit type</th>
<th>TC-6-C</th>
<th>TC-9-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound pressure level (at a distance of 5 m)</td>
<td>51</td>
<td>59</td>
</tr>
<tr>
<td>Total sound power level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Octave sound power level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63 Hz dB</td>
<td>41</td>
<td>49</td>
</tr>
<tr>
<td>125 Hz dB</td>
<td>59</td>
<td>67</td>
</tr>
<tr>
<td>250 Hz dB</td>
<td>62</td>
<td>70</td>
</tr>
<tr>
<td>500 Hz dB</td>
<td>65</td>
<td>73</td>
</tr>
<tr>
<td>1000 Hz dB</td>
<td>67</td>
<td>75</td>
</tr>
<tr>
<td>2000 Hz dB</td>
<td>67</td>
<td>75</td>
</tr>
<tr>
<td>4000 Hz dB</td>
<td>66</td>
<td>74</td>
</tr>
<tr>
<td>8000 Hz dB</td>
<td>61</td>
<td>68</td>
</tr>
</tbody>
</table>

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

Table C1: TopVent® TC sound power levels
3.8 Dimensions and weights

Fig. C12: TopVent® TC dimensional drawing

<table>
<thead>
<tr>
<th>Unit size</th>
<th>TC-6</th>
<th>TC-9</th>
<th>TC-9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coil type</strong></td>
<td><strong>A</strong></td>
<td><strong>B</strong></td>
<td><strong>C</strong></td>
</tr>
<tr>
<td><strong>mm</strong></td>
<td>900</td>
<td>1100</td>
<td>1100</td>
</tr>
<tr>
<td><strong>mm</strong></td>
<td>1344</td>
<td>1430</td>
<td>1430</td>
</tr>
<tr>
<td><strong>mm</strong></td>
<td>594</td>
<td>846</td>
<td>846</td>
</tr>
<tr>
<td><strong>mm</strong></td>
<td>758</td>
<td>882</td>
<td>882</td>
</tr>
<tr>
<td><strong>mm</strong></td>
<td>77</td>
<td>93</td>
<td>85</td>
</tr>
<tr>
<td><strong>mm</strong></td>
<td>155</td>
<td>171</td>
<td>180</td>
</tr>
<tr>
<td><strong>mm</strong></td>
<td>760</td>
<td>935</td>
<td>935</td>
</tr>
<tr>
<td><strong>mm</strong></td>
<td>521</td>
<td>558</td>
<td>558</td>
</tr>
<tr>
<td><strong>mm</strong></td>
<td>1030</td>
<td>1230</td>
<td>1230</td>
</tr>
<tr>
<td><strong>mm</strong></td>
<td>1375</td>
<td>1463</td>
<td>1463</td>
</tr>
<tr>
<td><strong>J</strong></td>
<td>*</td>
<td>Rp 1¼ (internal)</td>
<td>Rp 1½ (internal)</td>
</tr>
<tr>
<td><strong>M</strong></td>
<td>*</td>
<td>G 1 (external)</td>
<td>G 1 (external)</td>
</tr>
<tr>
<td><strong>Water content of heating/cooling coil</strong></td>
<td>l</td>
<td>7.9</td>
<td>12.4</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>kg</td>
<td>216</td>
<td>265</td>
</tr>
</tbody>
</table>

Table C13: TopVent® TC dimensions and weights
4 Specification texts

4.1 TopVent® TC

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

The unit consists of the following components:
- Fan unit
- Heating/cooling section
- Air-Injector
- Unit control box or terminal box
- Optional components

TopVent® TC units comply with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of energy-related products. They are systems of the ‘fan coil unit’ type.

Fan unit

Consisting of radial fan with high-efficiency EC motor, backwards-curved, three-dimensional contoured blades and free-running rotor made of a high-performance composite material, aerodynamically optimised inflow nozzle, low-noise, with integrated overload protection (integrated in the heating/cooling section).

Heating/cooling section

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored polyurethane.
The heating/cooling section contains:
- The highly efficient heating/cooling coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the hot water and cold water supply
- The pull-out condensate separator with collecting channel, made of high-quality corrosion-resistant material, with a downslope in all directions for rapid draining
- The condensate trap for connecting to a condensate drain (supplied).

Air-Injector

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored polyurethane, with:
- Vortex air distributor with concentric outlet nozzle, adjustable vanes and integrated absorber hood
- Actuator for infinitely variable adjustment of the air distribution from vertical to horizontal for draught-free air distribution in the hall under changing operating conditions
- Supply air temperature sensor

Unit control box

Control box fitted at the side of the housing for connection of the power supply and housing the control components that facilitate energy-optimised operation, controlled by the control system TopTronic® C. Plastic housing, protection rating IP 56. The following components are installed:
- Main switch
- Circuit board with all required electrical components, unit controller (clipped on) as well as connection terminals for the following external connections:
  - Heating/cooling valve
  - Heating/cooling pump
  - Return temperature sensor
  - Condensate pump
  - Door contact
The circuit board is fitted with push-in terminals facilitating easy installation of the connection cables. All components in the unit control box as well as sensors and actuators in the unit are fully factory-wired.
Power supply and bus connection to be installed on site.

Terminal box (variant)

Terminal box fitted at the side of the housing for connection of the power supply and peripheral components of the unit. Plastic housing, protection rating IP 56. The following components are installed:
- Main switch
- Circuit board with all required electrical components as well as connection terminals for the following signals:
  - Input Enable fan
  - Input Control signal fan
  - Output Control signal next fan
  - Input Control signal actuator Air-Injector
  - Output Control signal next actuator Air-Injector
  - Output Feedback control signal Air-Injector
  - Output Error
The following sensors and actuators in the unit are factory-wired:
- Fan
- Supply air temperature sensor
- Actuator Air-Injector
Options for the unit

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

**Filter box:**
Housing made of aluzinc sheet with 2 ISO coarse 60% bag filters (G4), with differential pressure switch for filter monitoring, factory-wired to the circuit board in the unit control box.

**Flat filter box:**
Housing made of aluzinc sheet with 4 pleated ISO coarse 60% cell filters (G4), with differential pressure switch for filter monitoring, factory-wired to the circuit board in the unit control box.

**Standard paint finish:**
External paint finish in Hoval red (RAL 3000)

**Paint finish as desired:**
Choice of external paint finish in RAL colour

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

**Hydraulic assembly diverting system:**
Prefabricated assembly for hydraulic diverting system, consisting of mixing valve, regulating valve, ball valve, automatic air vent and screw connections for connection to the unit and to the distributor circuit; mixing valve with plug-in connection, sized for the coil in the unit and the Hoval TopTronic® C control system.

**Mixing valve:**
Mixing valve with modulating rotary actuator and plug-in connection, sized for the coil in the unit.

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

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

**Return temperature sensor:**
Temperature sensor for monitoring the heating medium.

4.2 TopTronic® C – System control

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

The control system is customised and preconfigured ex works. Zone allocation:
- Zone 1: __x Unit type _______________
- Zone 2: __x Unit type _______________
- Zone 3: __x Unit type _______________
- ...

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

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

**Control functions:**
- Control of the supply air temperature using room supply air cascade control via sequential control of the energy recovery and the coils (depending on the unit type)
- Demand-driven control of the room air quality by variation of the supply air and exhaust air volume flows with minimum and maximum limit (for supply and extract air handling units, optional)
- Control of the unit including the air distribution according to the specifications of the zone controller
Alarms, protection:
- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms; forwarding via e-mail can be set in the parameters.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (for supply air units as well as supply and extract air handling units)
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

Options for the zone control panel:
- Design for heating (TH, TC, THC, MH, MC, MHC)
- Design for cooling (TC, THC, MC, MHC)
- Cooling lock switch (TC, THC, MC, MHC)
- Alarm lamp
- Socket
- Additional room air temperature sensors (max. 3)
- Combination sensor room air quality, temperature and humidity
- External sensor values
- External set values
- Load shedding input
- Operating selector switch on terminal
- Operating selector button on terminal
- Power supply for air handling unit
- Safety relay
- Control of distributor pump, incl. power supply

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

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

System structure:
- Unit controller: installed in the particular indoor climate unit
- Zone bus: as serial connection of all unit controllers with the zone controller; with robust bus protocol via shielded and twisted-pair bus line (bus cables provided by the client)
- Zone control panel, designed as compact cabinet for wall installation, made of coated sheet steel (light grey RAL 7035), with:
  - Zone controller with operating panel, making it simple to operate and monitor the system
  - Fresh air temperature sensor
  - Room temperature sensor

Control functions:
- Control of the supply air temperature via sequential control of the coils
- Control of the unit including the air distribution according to the specifications of the zone controller

Alarms, protection:
- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (for supply air units)
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

Options for the zone control panel:
- Additional room air temperature sensors (max. 3)
- Operating of the units via building management system via standardised interfaces:
  - BACnet
  - Modbus IP
  - Modbus RTU
TopVent® THC
Recirculation units for heating and cooling spaces up to 25 m in height with central heat and cold supply (4-pipe-system)

1 Use ........................................................................................................... 30
2 Construction and operation ................................................................. 30
3 Technical data .................................................................................. 33
4 Specification texts ........................................................................... 38
1 Use

1.1 Intended use

TopVent® THC units are recirculation units for heating and cooling spaces up to 25 m in height with central heat and cold supply. They have the following functions:
- Heating (with connection to a hot water supply)
- Cooling (with connection to a water chiller)
- Recirculation operation
- Air distribution with adjustable Air-Injector
- Air filtration (option)

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

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

1.2 User group

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

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

2 Construction and operation

2.1 Structure

The TopVent® THC unit consists of the following components:
- Fan unit:
  Diagonal fan with energy-saving EC motor, maintenance-free and infinitely variable
- Heating section:
  contains the heating coil for heating the supply air with hot water
- Cooling section:
  contains the cooling coil for cooling the supply air with cold water and the condensate separator for the condensate generated
- Air-Injector:
  Patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area

As part of the TopTronic® C control system, the unit control box is an integral component. The following components are installed:
- Unit controller: this component controls the unit including the air distribution according to the specifications of the control zone. The unit controller is connected to the other components of the TopTronic® C control system via system bus.
- Main switch
- Circuit board with electrical components and external connections

All unit components are fully factory-wired.

Figure D1: TopVent® THC components
2.2 Function diagram

- Extract air
- Air filter with differential pressure switch (option)
- Heating coil
- Cooling coil
- Condensate separator
- Fan
- Air-Injector with actuator
- Supply air temperature sensor
- Supply air

Fig. D3: TopVent® THC function diagram
## 2.3 Operating modes

The TopVent® THC has the following operating modes:
- Recirculation
- Recirculation speed 1
- Standby

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

### Table D4: TopVent® THC operating modes

<table>
<thead>
<tr>
<th>Code</th>
<th>Operating mode</th>
<th>Description</th>
</tr>
</thead>
</table>
| REC  | Recirculation | Fan …………………… speed 1/2 ¹)  
Heating/cooling …………… on  
¹) Depending on heat or cool demand |
| DES  | Destratification: | Fan …………………… speed 2  
Heating/cooling …………… off |
| REC1 | Recirculation speed 1 | Fan …………………… speed 1 ¹) 
Heating/cooling …………… on  
¹) Depending on heat or cool demand |
| DES  | Destratification: | Fan …………………… speed 1 
Heating/cooling …………… off |
| ST   | Standby | The unit is normally switched off. The following functions remain active: |
| CPR  | Cooling protection: | Fan …………………… speed 2  
Heating …………………… on |
| OPR  | Overheating protection: | Fan …………………… speed 2  
Cooling …………………… on |
| L_OFF| Off (local operating mode) | Fan …………………… off  
Heating/cooling …………… off |
| –    | Forced heating | Fan …………………… speed 2  
Heating …………………… on |

1) Depending on heat or cool demand

Forced heating: The unit draws in room air, warms it and blows it back into the room. Forced heating is activated by connecting the unit to a power supply (only if there is no bus connection to the zone controller). For example, it is suitable for heating the hall before taking the control system into operation or if the controller fails during the heating period.
TopVent® THC

3 Technical data

3.1 Unit type reference

<table>
<thead>
<tr>
<th>Unit type</th>
<th>TopVent® THC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit size</td>
<td>6 or 9</td>
</tr>
<tr>
<td>Heating section</td>
<td>A with coil type A</td>
</tr>
<tr>
<td></td>
<td>B with coil type B</td>
</tr>
<tr>
<td></td>
<td>C with coil type C</td>
</tr>
<tr>
<td>Cooling section</td>
<td>C with coil type C</td>
</tr>
<tr>
<td></td>
<td>D with coil type D</td>
</tr>
</tbody>
</table>

Further options

Table D5: Unit type reference TopVent® THC

3.2 Application limits

<table>
<thead>
<tr>
<th>Parameter</th>
<th>THC-6</th>
<th>THC-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extract air temperature max. °C</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Supply air temperature max. °C</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Temperature of the heating medium max. °C</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Pressure of the heating medium max. kPa</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>Air flow rate Size 6: min. m³/h</td>
<td>3100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Size 9: min. m³/h</td>
<td>5000</td>
</tr>
<tr>
<td>Condensate quantity Size 6: max. kg/h</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Size 9: max. kg/h</td>
<td>150</td>
</tr>
</tbody>
</table>

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

1) Design for higher temperatures on request

Table D6: TopVent® THC application limits

3.3 Electrical connection

<table>
<thead>
<tr>
<th>Parameter</th>
<th>THC-6</th>
<th>THC-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage V AC</td>
<td>3 × 400</td>
<td>3 × 400</td>
</tr>
<tr>
<td>Permitted voltage tolerance %</td>
<td>± 5</td>
<td>± 5</td>
</tr>
<tr>
<td>Frequency Hz</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Connected load kW</td>
<td>3.6</td>
<td>3.6</td>
</tr>
<tr>
<td>Current consumption max. A</td>
<td>5.9</td>
<td>5.9</td>
</tr>
<tr>
<td>Series fuse A</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Protection rating - IP</td>
<td>54</td>
<td>54</td>
</tr>
</tbody>
</table>

Table D7: TopVent® THC electrical connections

3.4 Flow rate, product parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>THC-6</th>
<th>THC-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal air flow rate m³/h</td>
<td>6000</td>
<td>9000</td>
</tr>
<tr>
<td>Floor area covered m²</td>
<td>537</td>
<td>946</td>
</tr>
<tr>
<td>Static efficiency of the fans %</td>
<td>63.6</td>
<td>63.6</td>
</tr>
<tr>
<td>Effective electric power input kW</td>
<td>0.72</td>
<td>0.76</td>
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<tr>
<td></td>
<td>0.87</td>
<td>1.37</td>
</tr>
<tr>
<td></td>
<td>1.49</td>
<td>1.42</td>
</tr>
<tr>
<td></td>
<td>1.54</td>
<td>1.56</td>
</tr>
<tr>
<td></td>
<td>1.68</td>
<td></td>
</tr>
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</table>

Table D8: TopVent® THC technical data
3.5 Heat output

<table>
<thead>
<tr>
<th>Heating medium temperature</th>
<th>Type</th>
<th>t\text{room}</th>
<th>Q</th>
<th>H\text{max}</th>
<th>t\text{s}</th>
<th>∆p\text{W}</th>
<th>m\text{W}</th>
<th>Q</th>
<th>H\text{max}</th>
<th>t\text{s}</th>
<th>∆p\text{W}</th>
<th>m\text{W}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>°C</td>
<td>kW</td>
<td>m</td>
<td>°C</td>
<td>kPa</td>
<td>l/h</td>
<td>kW</td>
<td>m</td>
<td>°C</td>
<td>kPa</td>
<td>l/h</td>
</tr>
<tr>
<td>80/60 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>60/40 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>THC-6</td>
<td>A</td>
<td>16</td>
<td>32.8</td>
<td>13.4</td>
<td>34.2</td>
<td>7</td>
<td>1410</td>
<td>18.8</td>
<td>16.8</td>
<td>27.3</td>
<td>2</td>
<td>807</td>
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<tr>
<td></td>
<td></td>
<td>20</td>
<td>30.3</td>
<td>14.0</td>
<td>37.0</td>
<td>6</td>
<td>1301</td>
<td>16.2</td>
<td>17.9</td>
<td>30.0</td>
<td>2</td>
<td>697</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>16</td>
<td>47.0</td>
<td>11.6</td>
<td>41.3</td>
<td>13</td>
<td>2020</td>
<td>26.9</td>
<td>14.6</td>
<td>31.3</td>
<td>4</td>
<td>1157</td>
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<tr>
<td></td>
<td></td>
<td>20</td>
<td>43.4</td>
<td>12.0</td>
<td>43.5</td>
<td>11</td>
<td>1864</td>
<td>23.3</td>
<td>15.5</td>
<td>33.5</td>
<td>3</td>
<td>1001</td>
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<tr>
<td></td>
<td>C</td>
<td>16</td>
<td>76.0</td>
<td>9.4</td>
<td>55.6</td>
<td>18</td>
<td>3267</td>
<td>45.0</td>
<td>11.8</td>
<td>40.3</td>
<td>6</td>
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<td></td>
<td></td>
<td>20</td>
<td>70.3</td>
<td>9.8</td>
<td>56.8</td>
<td>16</td>
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<td>39.3</td>
<td>12.5</td>
<td>41.5</td>
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<td>1690</td>
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<td>THC-9</td>
<td>A</td>
<td>16</td>
<td>55.5</td>
<td>13.6</td>
<td>36.3</td>
<td>8</td>
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<tr>
<td></td>
<td>B</td>
<td>16</td>
<td>71.2</td>
<td>12.2</td>
<td>41.5</td>
<td>12</td>
<td>3060</td>
<td>40.6</td>
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<td>4</td>
<td>1746</td>
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<td>20</td>
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<td>12.7</td>
<td>43.7</td>
<td>10</td>
<td>2823</td>
<td>35.1</td>
<td>16.5</td>
<td>33.6</td>
<td>3</td>
<td>1509</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>16</td>
<td>117.9</td>
<td>9.8</td>
<td>56.9</td>
<td>18</td>
<td>5066</td>
<td>69.9</td>
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<td>41.1</td>
<td>6</td>
<td>3003</td>
</tr>
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<td></td>
<td></td>
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<td>10.2</td>
<td>58.0</td>
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<td>13.1</td>
<td>42.1</td>
<td>5</td>
<td>2622</td>
</tr>
</tbody>
</table>

Legend:  
Type = Type of coil  
t\text{room} = Room air temperature  
Q = Heat output  
H\text{max} = Maximum mounting height  
t\text{s} = Supply air temperature  
∆p\text{W} = Water pressure drop  
m\text{W} = Water quantity  

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

Table D9: TopVent® THC heat outputs
### 3.6 Cooling capacities

<table>
<thead>
<tr>
<th>Cooling medium temperature</th>
<th>6/12 °C</th>
<th>8/14 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t&lt;sub&gt;room&lt;/sub&gt;</td>
<td>RH&lt;sub&gt;room&lt;/sub&gt;</td>
</tr>
<tr>
<td></td>
<td>°C</td>
<td>%</td>
</tr>
<tr>
<td>THC-6</td>
<td>C</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26</td>
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<td></td>
<td></td>
<td>70</td>
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<tr>
<td></td>
<td>D</td>
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<tr>
<td></td>
<td></td>
<td>70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70</td>
</tr>
</tbody>
</table>

**Legend:**
- **Type** = Type of coil
- **t<sub>room</sub>** = Room air temperature
- **RH<sub>room</sub>** = Relative humidity of the room air
- **Q<sub>sen</sub>** = Sensible cooling capacity
- **Q<sub>tot</sub>** = Total cooling capacity
- **t<sub>s</sub>** = Supply air temperature
- **ΔP<sub>W</sub>** = Water pressure drop
- **m<sub>W</sub>** = Water quantity
- **m<sub>C</sub>** = Condensate quantity

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

Table D10: TopVent® THC cooling capacities
### 3.7 Sound data

#### Table D11: TopVent® THC sound power levels

<table>
<thead>
<tr>
<th>Unit type</th>
<th>THC-6CC</th>
<th>THC-9CC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound pressure level (at a distance of 5 m)¹</td>
<td>dB(A)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>54</td>
<td>60</td>
</tr>
<tr>
<td>Total sound power level</td>
<td>dB(A)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>76</td>
<td>82</td>
</tr>
<tr>
<td>Octave sound power level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63 Hz dB</td>
<td>41</td>
<td>47</td>
</tr>
<tr>
<td>125 Hz dB</td>
<td>59</td>
<td>66</td>
</tr>
<tr>
<td>250 Hz dB</td>
<td>62</td>
<td>69</td>
</tr>
<tr>
<td>500 Hz dB</td>
<td>68</td>
<td>74</td>
</tr>
<tr>
<td>1000 Hz dB</td>
<td>71</td>
<td>77</td>
</tr>
<tr>
<td>2000 Hz dB</td>
<td>71</td>
<td>76</td>
</tr>
<tr>
<td>4000 Hz dB</td>
<td>67</td>
<td>74</td>
</tr>
<tr>
<td>8000 Hz dB</td>
<td>56</td>
<td>67</td>
</tr>
</tbody>
</table>

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

### 3.8 Dimensions and weights

#### Table D12: TopVent® THC dimensions and weights

<table>
<thead>
<tr>
<th>Unit size</th>
<th>THC-6</th>
<th>THC-9</th>
<th>THC-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil type</td>
<td>AC</td>
<td>BC</td>
<td>CC</td>
</tr>
<tr>
<td>A</td>
<td>mm</td>
<td>900</td>
<td>1100</td>
</tr>
<tr>
<td>B</td>
<td>mm</td>
<td>1647</td>
<td>1765</td>
</tr>
<tr>
<td>E</td>
<td>mm</td>
<td>594</td>
<td>846</td>
</tr>
<tr>
<td>F</td>
<td>mm</td>
<td>758</td>
<td>882</td>
</tr>
<tr>
<td>G</td>
<td>mm</td>
<td>101</td>
<td>111</td>
</tr>
<tr>
<td>H</td>
<td>mm</td>
<td>179</td>
<td>189</td>
</tr>
<tr>
<td>I</td>
<td>mm</td>
<td>349</td>
<td>395</td>
</tr>
<tr>
<td>J</td>
<td>mm</td>
<td>427</td>
<td>473</td>
</tr>
<tr>
<td>K</td>
<td>mm</td>
<td>760</td>
<td>935</td>
</tr>
<tr>
<td>N</td>
<td>mm</td>
<td>1030</td>
<td>1230</td>
</tr>
<tr>
<td>O</td>
<td>mm</td>
<td>792</td>
<td>880</td>
</tr>
<tr>
<td>P</td>
<td>mm</td>
<td>312</td>
<td>342</td>
</tr>
<tr>
<td>Q</td>
<td>*</td>
<td>Rp 1½ (internal)</td>
<td>Rp 1½ (internal)</td>
</tr>
<tr>
<td>R</td>
<td>*</td>
<td>Rp 1½ (internal)</td>
<td>Rp 1½ (internal)</td>
</tr>
<tr>
<td>S</td>
<td>*</td>
<td>G 1 (external)</td>
<td>G 1 (external)</td>
</tr>
<tr>
<td>Water content of heating coil</td>
<td>l</td>
<td>4.6</td>
<td>4.6</td>
</tr>
<tr>
<td>Water content of cooling coil</td>
<td>l</td>
<td>7.9</td>
<td>7.9</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>248</td>
<td>248</td>
</tr>
</tbody>
</table>

Table D12: TopVent® THC dimensions and weights
TopVent® THC

Fig. D13: TopVent® THC dimensional drawing

1 Return heating
2 Flow heating
3 Return cooling
4 Flow cooling
5 Condensate connection
6 Access panel
4 Specification texts

4.1 TopVent® THC

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

The unit consists of the following components:
- Fan unit
- Heating section
- Cooling section
- Air-Injector
- Unit control box
- Optional components

TopVent® THC units comply with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of energy-related products. They are systems of the ‘fan coil unit’ type.

Fan unit

Consisting of radial fan with high-efficiency EC motor, backwards-curved, three-dimensional contoured blades and free-running rotor made of a high-performance composite material, aerodynamically optimised inflow nozzle, low-noise, with integrated overload protection (integrated in the cooling section).

Heating section

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials. The heating section contains:
- The highly efficient heating coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the hot water supply
- The pull-out condensate separator with collecting channel, made of high-quality corrosion-resistant material, with a downslope in all directions for rapid draining
- The condensate trap for connecting to a condensate drain (supplied).

Air-Injector

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored polyurethane, with:
- Vortex air distributor with concentric outlet nozzle, adjustable vanes and integrated absorber hood
- Actuator for infinitely variable adjustment of the air distribution from vertical to horizontal for draught-free air distribution in the hall under changing operating conditions
- Supply air temperature sensor

Unit control box

Control box fitted at the side of the housing for connection of the power supply and housing the control components that facilitate energy-optimised operation, controlled by the control system TopTronic® C. Plastic housing, protection rating IP 56. The following components are installed:
- Main switch
- Circuit board with all required electrical components, unit controller (clipped on) as well as connection terminals for the following external connections:
  - Heating/cooling valve
  - Heating/cooling pump
  - Return temperature sensor
  - Condensate pump
The circuit board is fitted with push-in terminals facilitating easy installation of the connection cables. All components in the unit control box as well as sensors and actuators in the unit are fully factory-wired.
Power supply and bus connection to be installed on site.

Options for the unit

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

Filter box:
Housing made of aluzinc sheet with 2 ISO coarse 60% bag filters (G4), with differential pressure switch for filter monitoring, factory-wired to the circuit board in the unit control box.
Flat filter box:
Housing made of aluzinc sheet with 4 pleated ISO coarse 60% cell filters (G4), with differential pressure switch for filter monitoring, factory-wired to the circuit board in the unit control box.

**Standard paint finish:**
External paint finish in Hoval red (RAL 3000)

**Paint finish as desired:**
Choice of external paint finish in RAL colour

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

**Hydraulic assembly diverting system:**
Prefabricated assembly for hydraulic diverting system, consisting of mixing valve, regulating valve, ball valve, automatic air vent and screw connections for connection to the unit and to the distributor circuit; mixing valve with plug-in connection, sized for the coil in the unit and the Hoval TopTronic® C control system.

**Mixing valve:**
Mixing valve with modulating rotary actuator and plug-in connection, sized for the coil in the unit.

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

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

**Return temperature sensor:**
Temperature sensor for monitoring the heating medium.

**4.2 TopTronic® C – System control**
Zone-based control system ex-works for operation of decentralised Hoval indoor climate systems with optimised use of energy, suitable for demand-driven control of overall systems comprising up to 64 control zones each with up to 15 supply and extract air handling units or supply air units and 10 recirculation units.

The control system is customised and preconfigured ex works. Zone allocation:
- Zone 1: __ x Unit type ____________
- Zone 2: __ x Unit type ____________
- Zone 3: __ x Unit type ____________
- …

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

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

**Control functions:**
- Control of the supply air temperature using room supply air cascade control via sequential control of the energy recovery and the coils (depending on the unit type)
- Demand-driven control of the room air quality by variation of the supply air and exhaust air volume flows with minimum and maximum limit (for supply and extract air handling units, optional)
- Control of the unit including the air distribution according to the specifications of the zone controller
Alarms, protection:
- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms; forwarding via e-mail can be set in the parameters.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (for supply air units as well as supply and extract air handling units)
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

Options for the zone control panel:
- Design for heating (TH, TC, THC, MH, MC, MHC)
- Design for cooling (TC, THC, MC, MHC)
- Cooling lock switch (TC, THC, MC, MHC)
- Alarm lamp
- Socket
- Additional room air temperature sensors (max. 3)
- Combination sensor room air quality, temperature and humidity
- External sensor values
- External set values
- Load shedding input
- Operating selector switch on terminal
- Operating selector button on terminal
- Power supply for air handling unit
- Safety relay
- Control of distributor pump, incl. power supply

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

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

System structure:
- Unit controller: installed in the particular indoor climate unit
- Zone bus: as serial connection of all unit controllers with the zone controller; with robust bus protocol via shielded and twisted-pair bus line (bus cables provided by the client)
- Zone control panel, designed as compact cabinet for wall installation, made of coated sheet steel (light grey RAL 7035), with:
  - Zone controller with operating panel, making it simple to operate and monitor the system
  - Fresh air temperature sensor
  - Room temperature sensor

Control functions:
- Circuit board with external connections for:
  - Collective alarm
  - Forced off (zone controller)
  - Forced off (supply air unit)
  - Heating demand
  - Setpoint heating demand
  - Fault heat supply
  - Cooling demand
  - Fault cold supply
  - External enabling heating/cooling
  - External setting heating/cooling
  - Changeover valves heating/cooling
  - Additional room air temperature sensors (max. 3)
  - External setpoint fresh air ratio
  - Operating selector switch on terminal (digital)
  - Operating selector button on terminal

Alarms, protection:
- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (for supply air units)
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

Options for the zone control panel:
- Additional room air temperature sensors (max. 3)
- Operating of the units via building management system via standardised interfaces:
  - BACnet
  - Modbus IP
  - Modbus RTU
TopVent® MH
Supply air units for ventilating and heating spaces up to 25 m in height with central heat supply

1 Use .............................................................................................................42
2 Construction and operation ......................................................................42
3 Technical data ..........................................................................................46
4 Specification texts .....................................................................................49
1 Use

1.1 Intended use

TopVent® MH units are supply air units for ventilating and heating spaces up to 25 m in height with central heat supply. They have the following functions:
- Heating (with connection to a hot water supply)
- Fresh air supply
- Mixed air operation
- Recirculation operation
- Air distribution with adjustable Air-Injector
- Air filtration

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

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

1.2 User group

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

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

2 Construction and operation

2.1 Structure

The TopVent® MH unit consists of the following components:
- Fan unit: Diagonal fan with energy-saving EC motor, maintenance-free and infinitely variable
- Heating section: contains the heating coil for heating the supply air with hot water
- Air-Injector: Patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area
- Filter box: contains 2 ISO Coarse 60 % bag filters (G4), easily accessible behind the sliding door
- Mixed air box: contains fresh air damper and recirculation damper linked to move in opposite directions and actuator with spring return

As part of the TopTronic® C control system, the unit control box is an integral component. The following components are installed:
- Unit controller: this component controls the unit including the air distribution according to the specifications of the control zone. The unit controller is connected to the other components of the TopTronic® C control system via system bus.
- Main switch
- Circuit board with electrical components and external connections

All unit components are fully factory-wired.

Fig. E1: TopVent® MH components
2.2 Function diagram

1. Fresh air
2. Fresh air damper with actuator
3. Recirculation damper (opposed to the fresh air damper)
4. Extract air
5. Air filter with differential pressure switch
6. Fan
7. Heating coil
8. Frost controller
9. Air-injector with actuator
10. Supply air temperature sensor
11. Supply air
2.3 Operating modes

The TopVent® MH operates in the following modes:

- Supply air speed 2
- Supply air speed 1
- Recirculation
- Recirculation speed 1
- Standby

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

- The operating mode of a control zone can be switched over manually.
- Each TopVent® MH unit can operate individually in a local operating mode: Off, Supply air speed 2, Supply air speed 1, Recirculation, Recirculation speed 1.

<table>
<thead>
<tr>
<th>Code</th>
<th>Operating mode</th>
<th>Description</th>
</tr>
</thead>
</table>
| SA2  | Supply air speed 2 | Fan .................. speed 2  
|      | The unit blows fresh air into the room. The fresh air ratio is adjustable.  
|      | The heating is regulated according to the heat demand. The room temperature set value day is active. The unit operates at speed 2 (high air flow rate).  
|      | Fresh air damper ........ 10 % open ¹  
|      | Heating .................. on ²  
|      | ¹ Percentage is adjustable  
|      | ² Depending on heat demand |
| SA1  | Supply air speed 1 | Fan .................. speed 1  
|      | The same as SA2, but the unit operates only at speed 1 (low air flow rate)  
|      | Fresh air damper ........ 10 % open ¹  
|      | Heating .................. on ²  
|      | ¹ Percentage is adjustable  
|      | ² Depending on heat demand |
| REC  | Recirculation  
|      | On/off-operation: if heating is required, the unit draws in room air, heats it and returns the warm air back into the room. The room temperature set value day is active.  
|      | Fan .................. speed 1/2 ¹  
|      | Fresh air damper ........ closed  
|      | Heating .................. off  
|      | ¹ Depending on heat demand |
| DES  | Destratification:  
|      | To avoid heat build-up under the ceiling, it may be appropriate to switch on the fan when there is no heat demand (either in permanent operation or in on/off operation depending on air temperature under the ceiling, as desired).  
|      | Fan .................. speed 2  
|      | Fresh air damper ........ closed  
|      | Heating .................. off |
| REC1 | Recirculation speed 1 | Fan .................. speed 1  
|      | The same as REC, but the unit operates only at speed 1 (low air flow rate)  
|      | Fresh air damper ........ closed  
|      | Heating .................. on ¹  
|      | ¹ Depending on heat demand |
| DES  | Destratification:  
|      | The same as for REC, but the unit operates only at speed 1  
|      | Fan .................. speed 1  
|      | Fresh air damper ........ closed  
|      | Heating .................. off |
| ST   | Standby  
|      | The unit is normally switched off. The following functions remain active:  
| CPR  | Cooling protection:  
|      | If the room temperature drops below the set value for cooling protection, the unit heats up the room in recirculation operation.  
|      | Fan .................. speed 2  
|      | Fresh air damper ........ closed  
|      | Heating .................. on |
| NCS  | Night cooling:  
|      | If the room temperature exceeds the set value for night cooling and the current fresh air temperature permits it, the unit blows cool fresh air into the room and extracts warmer room air.  
|      | Fan .................. speed 2  
|      | Fresh air damper ........ open  
|      | Heating .................. off |
### TopVent® MH

<table>
<thead>
<tr>
<th>Code</th>
<th>Operating mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L_OFF</td>
<td>Off (local operating mode)</td>
<td>The unit is switched off. Frost protection for the unit remains active.</td>
</tr>
<tr>
<td></td>
<td>Fresh air damper...</td>
<td>closed</td>
</tr>
<tr>
<td></td>
<td>Heating ...............</td>
<td>off</td>
</tr>
<tr>
<td>Forced heating</td>
<td>The unit draws in room air, warms it and blows it back into the room. Forced heating can be activated and set as required by the Hoval service technician. For example, it is suitable for heating the hall before taking the control system into operation or if the controller fails during the heating period.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fan ..................</td>
<td>speed 2 ¹)</td>
</tr>
<tr>
<td></td>
<td>Fresh air damper.......</td>
<td>closed ¹)</td>
</tr>
<tr>
<td></td>
<td>Heating ................</td>
<td>on ¹)</td>
</tr>
</tbody>
</table>

¹) Adjustable by the Hoval service technician

Table E4: TopVent® MH operating modes
3 Technical data

3.1 Unit type reference

<table>
<thead>
<tr>
<th>Unit type</th>
<th>TopVent® MH</th>
</tr>
</thead>
<tbody>
<tr>
<td>TopVent® MH</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit size</th>
<th>6 or 9</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Heating section</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>with coil type A</td>
<td>with coil type B</td>
<td>with coil type C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Further options</th>
</tr>
</thead>
</table>

Table E5: Unit type reference TopVent® MH

3.2 Application limits

| Extract air temperature max. °C | 50 |
| Supply air temperature max. °C | 60 |
| Temperature of the heating medium max. °C | 90 |
| Pressure of the heating medium max. kPa | 800 |

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

1) Design for higher temperatures on request

Table E6: TopVent® MH application limits

3.3 Electrical connection

<table>
<thead>
<tr>
<th>Unit type</th>
<th>MH-6</th>
<th>MH-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage V AC</td>
<td>3 × 400</td>
<td>3 × 400</td>
</tr>
<tr>
<td>Permitted voltage tolerance %</td>
<td>± 5</td>
<td>± 5</td>
</tr>
<tr>
<td>Frequency Hz</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Connected load kW</td>
<td>1.5</td>
<td>2.1</td>
</tr>
<tr>
<td>Current consumption max. A</td>
<td>2.9</td>
<td>4.0</td>
</tr>
<tr>
<td>Series fuse A</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Protection rating -</td>
<td>IP 54</td>
<td>IP 54</td>
</tr>
</tbody>
</table>

Table E7: TopVent® MH electrical connection

3.4 Flow rate, product parameters

<table>
<thead>
<tr>
<th>Unit type</th>
<th>MH-6</th>
<th>MH-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil type</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Nominal air flow rate m³/h</td>
<td>6000</td>
<td>9000</td>
</tr>
<tr>
<td>Floor area covered m²</td>
<td>537</td>
<td>946</td>
</tr>
<tr>
<td>Static efficiency of the fans %</td>
<td>48.5</td>
<td>43.0</td>
</tr>
<tr>
<td>Effective electric power input kW</td>
<td>0.90</td>
<td>1.05</td>
</tr>
</tbody>
</table>

Table E8: TopVent® MH technical data
3.5 Heat output

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>tf °C</th>
<th>Q kW</th>
<th>Hmax m</th>
<th>ts °C</th>
<th>∆pW kPa</th>
<th>mw l/h</th>
<th>Q kW</th>
<th>Hmax m</th>
<th>ts °C</th>
<th>∆pW kPa</th>
<th>mw l/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH-6</td>
<td>A</td>
<td>-5</td>
<td>33.1</td>
<td>14.4</td>
<td>33.9</td>
<td>7</td>
<td>1424</td>
<td>19.1</td>
<td>18.8</td>
<td>2</td>
<td>820</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-15</td>
<td>33.8</td>
<td>14.7</td>
<td>33.2</td>
<td>8</td>
<td>1451</td>
<td>19.7</td>
<td>19.5</td>
<td>3</td>
<td>848</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-5</td>
<td>47.5</td>
<td>12.1</td>
<td>41.0</td>
<td>13</td>
<td>2040</td>
<td>27.4</td>
<td>15.7</td>
<td>4</td>
<td>1177</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-15</td>
<td>48.4</td>
<td>12.2</td>
<td>40.5</td>
<td>14</td>
<td>2079</td>
<td>28.3</td>
<td>16.1</td>
<td>5</td>
<td>1216</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>-5</td>
<td>76.8</td>
<td>9.7</td>
<td>55.5</td>
<td>18</td>
<td>3297</td>
<td>45.7</td>
<td>12.3</td>
<td>7</td>
<td>1965</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-15</td>
<td>78.2</td>
<td>9.7</td>
<td>55.2</td>
<td>19</td>
<td>3358</td>
<td>47.2</td>
<td>12.4</td>
<td>7</td>
<td>2026</td>
<td></td>
</tr>
<tr>
<td>MH-9</td>
<td>A</td>
<td>-5</td>
<td>56.1</td>
<td>14.4</td>
<td>36.0</td>
<td>8</td>
<td>2409</td>
<td>32.3</td>
<td>18.8</td>
<td>3</td>
<td>1387</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-15</td>
<td>57.1</td>
<td>14.6</td>
<td>35.4</td>
<td>8</td>
<td>2455</td>
<td>33.4</td>
<td>19.4</td>
<td>3</td>
<td>1433</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>-5</td>
<td>71.9</td>
<td>12.8</td>
<td>41.2</td>
<td>12</td>
<td>3090</td>
<td>41.3</td>
<td>16.7</td>
<td>4</td>
<td>1775</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-15</td>
<td>73.3</td>
<td>12.9</td>
<td>40.7</td>
<td>13</td>
<td>3149</td>
<td>42.7</td>
<td>17.0</td>
<td>4</td>
<td>1834</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>-5</td>
<td>119.0</td>
<td>10.1</td>
<td>56.8</td>
<td>18</td>
<td>5113</td>
<td>71.0</td>
<td>12.9</td>
<td>7</td>
<td>3050</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-15</td>
<td>121.2</td>
<td>10.1</td>
<td>56.5</td>
<td>19</td>
<td>5208</td>
<td>73.2</td>
<td>12.9</td>
<td>7</td>
<td>3145</td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- Type = Type of coil
- tf = Supply air temperature
- Q = Heat output
- Hmax = Maximum mounting height
- ts = Fresh air temperature
- ∆pW = Water pressure drop
- mw = Water quantity

Reference:
- Room air 18 °C, extract air 20 °C / 20 % rel. humidity
- Fresh air ratio 10 %

Table E9: TopVent® MH heat outputs

3.6 Sound data

<table>
<thead>
<tr>
<th>Unit type</th>
<th>MH-6C</th>
<th>MH-9C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound pressure level (at a distance of 5 m) 1)</td>
<td>dB(A)</td>
<td>58</td>
</tr>
<tr>
<td>Total sound power level</td>
<td>dB(A)</td>
<td>80</td>
</tr>
</tbody>
</table>
| Octave sound power level
  63 Hz dB | 57 | 62 |
  125 Hz dB | 61 | 66 |
  250 Hz dB | 67 | 71 |
  500 Hz dB | 72 | 74 |
  1000 Hz dB | 76 | 77 |
  2000 Hz dB | 73 | 76 |
  4000 Hz dB | 67 | 71 |
  8000 Hz dB | 59 | 64 |

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

Table E10: TopVent® MH sound power levels
3.7 Dimensions and weights

Fig. E11: TopVent® MH dimensional drawing

<table>
<thead>
<tr>
<th>Unit size</th>
<th>MH-6</th>
<th>MH-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil type</td>
<td>A (mm)</td>
<td>B (mm)</td>
</tr>
<tr>
<td>A</td>
<td>900</td>
<td>1100</td>
</tr>
<tr>
<td>F</td>
<td>758</td>
<td>882</td>
</tr>
<tr>
<td>G</td>
<td>1077</td>
<td>1127</td>
</tr>
<tr>
<td>H</td>
<td>999</td>
<td>1049</td>
</tr>
<tr>
<td>I</td>
<td>760</td>
<td>935</td>
</tr>
<tr>
<td>K</td>
<td>1089</td>
<td>1289</td>
</tr>
<tr>
<td>L</td>
<td>594</td>
<td>846</td>
</tr>
<tr>
<td>O × P</td>
<td>420 × 850</td>
<td>500 × 1050</td>
</tr>
<tr>
<td>R</td>
<td>1660</td>
<td>1810</td>
</tr>
<tr>
<td>T</td>
<td>795</td>
<td>800</td>
</tr>
<tr>
<td>J</td>
<td>Rp 1¼ (internal)</td>
<td>Rp 1½ (internal)</td>
</tr>
<tr>
<td>Water content of heating coil</td>
<td>4.6</td>
<td>4.6</td>
</tr>
<tr>
<td>Weight</td>
<td>165 kg</td>
<td>165</td>
</tr>
</tbody>
</table>
4 Specification texts

4.1 TopVent® MH

Supply air unit for heating rooms up to 25 m in height with central heat supply; equipped with highly efficient air distributor; maximum floor area reached per unit 537 m² (size 6) and 946 m² respectively (size 9).

The unit consists of the following components:
- Fan unit
- Heating section
- Air-Injector
- Filter box
- Mixed air box
- Unit control box
- Optional components

TopVent® TH units comply with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of energy-related products. They are systems of the ‘fan coil unit’ type.

Fan unit

Consisting of maintenance-free, direct-drive axial fan with high-efficiency EC motor and balanced rotating wheel with aerodynamically shaped blades and serrated trailing edge (integrated in the heating section).

Heating section

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials.

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

Air-Injector

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, with:
- Vortex air distributor with concentric outlet nozzle, adjustable vanes and integrated absorber hood
- Actuator for infinitely variable adjustment of the air distribution from vertical to horizontal for draught-free air distribution in the hall under changing operating conditions
- Supply air temperature sensor

Filter box

Housing made of aluzinc sheet with 2 ISO coarse 60% bag filters (G4), with differential pressure switch for filter monitoring, factory-wired to the circuit board in the unit control box.

Mixed air box

Housing made of aluzinc sheet with fresh air damper and recirculation damper linked to move in opposite directions; includes actuator with spring return, factory-wired to the circuit board in the unit control box.

Unit control box

Control box fitted at the side of the housing for connection of the power supply and housing the control components that facilitate energy-optimised operation, controlled by the control system TopTronic® C. Housing made of coated sheet steel (light grey RAL 7035), protection rating IP 54. The following components are installed:
- Main switch
- Circuit board with all required electrical components, unit controller (clipped on) as well as connection terminals for the following external connections:
  - Heating valve
  - Heating pump
  - Return temperature sensor
  - Forced off

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

Power supply and bus connection to be installed on site.

Options for the unit

Suspension set:

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

Standard paint finish:

External paint finish in Hoval red (RAL 3000)

Paint finish as desired:

Choice of external paint finish in RAL colour

Acoustic cowl:

consisting of an absorber hood of large volume, insertion attenuation 4 dB(A)
Hydraulic assembly diverting system:
Prefabricated assembly for hydraulic diverting system, consisting of mixing valve, regulating valve, ball valve, automatic air vent and screw connections for connection to the unit and to the distributor circuit; mixing valve with plug-in connection, sized for the coil in the unit and the Hoval TopTronic® C control system.

Mixing valve:
Mixing valve with modulating rotary actuator and plug-in connection, sized for the coil in the unit.

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

Return temperature sensor:
Temperature sensor for monitoring the heating medium.

4.2 TopTronic® C – System control

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

The control system is customised and preconfigured ex-works. Zone allocation:
- Zone 1: __ x Unit type __________________
- Zone 2: __ x Unit type __________________
- Zone 3: __ x Unit type __________________
- ...

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

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

Control functions:
- Control of the supply air temperature using room supply air cascade control via sequential control of the energy recovery and the coils (depending on the unit type)
- Demand-driven control of the room air quality by variation of the supply air and exhaust air volume flows with minimum and maximum limit (for supply and extract air handling units, optional)
- Control of the unit including the air distribution according to the specifications of the zone controller

Alarms, protection:
- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms; forwarding via e-mail can be set in the parameters.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (for supply air units as well as supply and extract air handling units)
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

Options for the zone control panel:
- Design for heating (TH, TC, THC, MH, MC, MHC)
- Design for cooling (TC, THC, MC, MHC)
- Cooling lock switch (TC, THC, MC, MHC)
- Alarm lamp
- Socket
- Additional room air temperature sensors (max. 3)
- Combination sensor room air quality, temperature and humidity
- External sensor values
- External set values
- Load shedding input
- Operating selector switch on terminal
- Operating selector button on terminal
- Power supply for air handling unit
- Safety relay
- Control of distributor pump, incl. power supply
4.3 TopTronic® C – System control for TopVent® C-SYS

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

System structure:
- Unit controller: installed in the particular indoor climate unit
- Zone bus: as serial connection of all unit controllers with the zone controller; with robust bus protocol via shielded and twisted-pair bus line (bus cables provided by the client)
- Zone control panel, designed as compact cabinet for wall installation, made of coated sheet steel (light grey RAL 7035), with:
  - Zone controller with operating panel, making it simple to operate and monitor the system
  - Fresh air temperature sensor
  - Room temperature sensor
- Circuit board with external connections for:
  - Collective alarm
  - Forced off (zone controller)
  - Forced off (supply air unit)
  - Heating demand
  - Setpoint heating demand
  - Fault heat supply
  - Cooling demand
  - Fault cold supply
  - External enabling heating/cooling
  - External setting heating/cooling
  - Changeover valves heating/cooling
  - Additional room air temperature sensors (max. 3)
  - External setpoint fresh air ratio
  - Operating selector switch on terminal (digital)
  - Operating selector button on terminal

Control functions:
- Control of the supply air temperature via sequential control of the coils
- Control of the unit including the air distribution according to the specifications of the zone controller

Alarms, protection:
- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (for supply air units)

- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

Options for the zone control panel:
- Additional room air temperature sensors (max. 3)
- Operating of the units via building management system via standardised interfaces:
  - BACnet
  - Modbus IP
  - Modbus RTU
TopVent® MC
Supply air units for ventilating, heating and cooling spaces up to 25 m in height with central heat and cold supply (2-pipe-system)

1 Use ................................................................. 54
2 Construction and operation ..................................... 54
3 Technical data .......................................................... 58
4 Specification texts ...................................................... 62
1 Use

1.1 Intended use

TopVent® MC units are supply air units for ventilating, heating and cooling spaces up to 25 m in height with central heat and cold supply. They have the following functions:
- Heating (with connection to a hot water supply)
- Cooling (with connection to a water chiller)
- Fresh air supply
- Mixed air operation
- Recirculation operation
- Air distribution with adjustable Air-Injector
- Air filtration

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

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

1.2 User group

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

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

2 Construction and operation

2.1 Structure

The TopVent® MC unit consists of the following components:
- Fan unit: Diagonal fan with energy-saving EC motor, maintenance-free and infinitely variable
- Heating/cooling section: contains the heating/cooling coil for heating and cooling the supply air with hot water or cold water and the condensate separator for the condensate generated
- Air-Injector: Patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area
- Filter box: contains 2 ISO Coarse 60% bag filters (G4), easily accessible behind the sliding door
- Mixed air box: contains fresh air damper and recirculation damper linked to move in opposite directions and actuator with spring return

As part of the TopTronic® C control system, the unit control box is an integral component. The following components are installed:
- Unit controller: this component controls the unit including the air distribution according to the specifications of the control zone. The unit controller is connected to the other components of the TopTronic® C control system via system bus.
- Main switch
- Circuit board with electrical components and external connections

All unit components are fully factory-wired.

![Fig. F1: TopVent® MC components](image-url)
2.2 Function diagram

1. Fresh air
2. Fresh air damper with actuator
3. Recirculation damper (opposed to the fresh air damper)
4. Extract air
5. Air filter with differential pressure switch
6. Frost controller
7. Heating/cooling coil
8. Condensate separator
9. Fan
10. Air-Injector with actuator
11. Supply air temperature sensor
12. Supply air

Fig. F2: TopVent® MC structure

Fig. F3: TopVent® MC function diagram
2.3 Operating modes

The TopVent® MC has the following operating modes:
- Supply air speed 2
- Supply air speed 1
- Recirculation
- Recirculation speed 1
- Standby

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Operating mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA2</td>
<td>Supply air speed 2</td>
<td>The unit blows fresh air into the room. The fresh air ratio is adjustable. Heating/cooling is controlled according to the heat/cool demand. The room temperature set value day is active. The unit operates at speed 2 (high air flow rate).</td>
</tr>
<tr>
<td></td>
<td>Fan .................... speed 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fresh air damper ........ 10 % open 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heating/cooling .......... on 2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1) Percentage is adjustable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) Depending on heat or cool demand</td>
<td></td>
</tr>
<tr>
<td>SA1</td>
<td>Supply air speed 1</td>
<td>The same as SA2, but the unit operates only at speed 1 (low air flow rate)</td>
</tr>
<tr>
<td></td>
<td>Fan .................... speed 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fresh air damper ........ 10 % open 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heating/cooling .......... on 2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1) Percentage is adjustable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) Depending on heat or cool demand</td>
<td></td>
</tr>
<tr>
<td>REC</td>
<td>Recirculation</td>
<td>On/off-operation: If heating or cooling is required, the unit draws in room air, heats or cools it and returns it back into the room. The room temperature set value day is active.</td>
</tr>
<tr>
<td></td>
<td>Fan .................... speed 1/2 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fresh air damper ........ closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heating/cooling .......... on 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1) Depending on heat or cool demand</td>
<td></td>
</tr>
<tr>
<td>DES</td>
<td>Destratification:</td>
<td>To avoid heat build-up under the ceiling, it may be appropriate to switch on the fan when there is no heat or cool demand (either in permanent operation or in on/off operation depending on air temperature under the ceiling, as desired).</td>
</tr>
<tr>
<td></td>
<td>Fan .................... speed 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fresh air damper ........ closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heating/cooling .......... off</td>
<td></td>
</tr>
<tr>
<td>REC1</td>
<td>Recirculation speed 1</td>
<td>The same as REC, but the unit operates only at speed 1 (low air flow rate)</td>
</tr>
<tr>
<td></td>
<td>Fan .................... speed 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fresh air damper ........ closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heating/cooling .......... on 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1) Depending on heat or cool demand</td>
<td></td>
</tr>
<tr>
<td>DES</td>
<td>Destratification:</td>
<td>The same as for REC, but the unit operates only at speed 1</td>
</tr>
<tr>
<td></td>
<td>Fan .................... speed 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fresh air damper ........ closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heating/cooling .......... off</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>Standby</td>
<td>The unit is normally switched off. The following functions remain active:</td>
</tr>
<tr>
<td>CPR</td>
<td>Cooling protection:</td>
<td>If the room temperature drops below the set value for cooling protection, the unit heats up the room in recirculation operation.</td>
</tr>
<tr>
<td></td>
<td>Fan .................... speed 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fresh air damper ........ closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heating ................ on</td>
<td></td>
</tr>
<tr>
<td>OPR</td>
<td>Overheating protection:</td>
<td>If the room temperature rises above the set value for overheating protection, the unit cools down the room in recirculation operation.</td>
</tr>
<tr>
<td></td>
<td>Fan .................... speed 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fresh air damper ........ closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cooling ................ on</td>
<td></td>
</tr>
<tr>
<td>NCS</td>
<td>Night cooling:</td>
<td>If the room temperature exceeds the set value for night cooling and the current fresh air temperature permits it, the unit blows cool fresh air into the room and extracts warmer room air.</td>
</tr>
<tr>
<td></td>
<td>Fan .................... speed 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fresh air damper ........ open</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heating/cooling .......... off</td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Operating mode</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>L_OFF</td>
<td>Off (local operating mode)</td>
<td>The unit is switched off. Frost protection for the unit remains active.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fan .................................. off</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh air damper .............. closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heating/cooling ................. off</td>
</tr>
<tr>
<td></td>
<td>Forced heating</td>
<td>The unit draws in room air, warms it and blows it back into the room.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Forced heating can be activated and set as required by the Hoval service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>technician. For example, it is suitable for heating the hall before</td>
</tr>
<tr>
<td></td>
<td></td>
<td>taking the control system into operation or if the controller fails</td>
</tr>
<tr>
<td></td>
<td></td>
<td>during the heating period.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fan .................................. speed 2 ¹)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh air damper .............. closed ¹)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heating ............................ on ¹)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>¹) Adjustable by the Hoval service technician</td>
</tr>
</tbody>
</table>

Table F4: TopVent® MC operating modes
3 Technical data

3.1 Unit type reference

TopVent® MC

Unit size
6 or 9

Heating/cooling section
C with coil type C
D with coil type D

Further options

Table F5: TopVent® MH unit type reference

3.2 Application limits

<table>
<thead>
<tr>
<th></th>
<th>max.</th>
<th>°C</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Extract air temperature</td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Supply air temperature</td>
<td></td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>Temperature of the heating medium</td>
<td></td>
<td></td>
<td>90</td>
</tr>
<tr>
<td>Pressure of the heating medium</td>
<td></td>
<td></td>
<td>800</td>
</tr>
</tbody>
</table>
| Air flow rate
  Size 6: | min. | m³/h | 3100 |
  Size 9: | min. | m³/h | 5000 |
| Condensate quantity
  Size 6: | max. | kg/h | 90   |
  Size 9: | max. | kg/h | 150  |

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

1) Design for higher temperatures on request

Table F6: TopVent® MC application limits

3.3 Electrical connection

<table>
<thead>
<tr>
<th></th>
<th>MC-6</th>
<th></th>
<th>MC-9</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>3 × 400</td>
<td>V AC</td>
<td>3 × 400</td>
<td>V AC</td>
</tr>
<tr>
<td>Permitted voltage tolerance</td>
<td>± 5</td>
<td>± 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>50</td>
<td>Hz</td>
<td>50</td>
<td>Hz</td>
</tr>
<tr>
<td>Connected load</td>
<td>3.6</td>
<td>kW</td>
<td>3.6</td>
<td>kW</td>
</tr>
<tr>
<td>Current consumption max.</td>
<td>A</td>
<td></td>
<td>5.9</td>
<td>A</td>
</tr>
<tr>
<td>Series fuse</td>
<td>A</td>
<td></td>
<td>13</td>
<td>A</td>
</tr>
<tr>
<td>Protection rating</td>
<td>-</td>
<td>IP 54</td>
<td>IP 54</td>
<td></td>
</tr>
</tbody>
</table>

Table F7: TopVent® MC electrical connection

3.4 Flow rate, product parameters

<table>
<thead>
<tr>
<th></th>
<th>MC-6</th>
<th></th>
<th>MC-9</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal air flow rate</td>
<td>m³/h</td>
<td>6000</td>
<td>9000</td>
<td></td>
</tr>
<tr>
<td>Floor area covered</td>
<td>m²</td>
<td>537</td>
<td>946</td>
<td></td>
</tr>
<tr>
<td>Static efficiency of the fans</td>
<td>%</td>
<td>63.6</td>
<td>63.6</td>
<td></td>
</tr>
<tr>
<td>Effective electric power input</td>
<td>kW</td>
<td>0.85</td>
<td>1.44</td>
<td>1.56</td>
</tr>
</tbody>
</table>

Table F8: TopVent® MC technical data
### 3.5 Heat output

<table>
<thead>
<tr>
<th>Heating medium temperature</th>
<th>80/60 °C</th>
<th>60/40 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>Type</td>
<td>t&lt;sub&gt;F&lt;/sub&gt;</td>
</tr>
<tr>
<td>-----</td>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td>MC-6</td>
<td>C</td>
<td>-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-15</td>
</tr>
<tr>
<td>MC-9</td>
<td>C</td>
<td>-5</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-15</td>
</tr>
</tbody>
</table>

**Legend:**
- Type: Type of coil
- t<sub>F</sub>: Fresh air temperature
- Q: Heat output
- H<sub>max</sub>: Maximum mounting height
- t<sub>S</sub>: Supply air temperature
- ∆P<sub>W</sub>: Water pressure drop
- m<sub>W</sub>: Water quantity
- m<sub>C</sub>: Condensate quantity

**Reference:**
- Room air 18 °C, extract air 20 °C / 20 % rel. humidity
- Fresh air ratio 10%

Table F9: TopVent® MC heat outputs

### 3.6 Cooling capacities

<table>
<thead>
<tr>
<th>Cooling medium temperature</th>
<th>6/12 °C</th>
<th>8/14 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>Type</td>
<td>t&lt;sub&gt;F&lt;/sub&gt;</td>
</tr>
<tr>
<td>-----</td>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td>MC-6</td>
<td>C</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>MC-9</td>
<td>C</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
</tr>
</tbody>
</table>

**Legend:**
- Type: Type of coil
- t<sub>F</sub>: Fresh air temperature
- RH<sub>F</sub>: Relative humidity of the fresh air
- Q<sub>sen</sub>: Sensible cooling capacity
- Q<sub>tot</sub>: Total cooling capacity
- m<sub>W</sub>: Water quantity
- m<sub>C</sub>: Condensate quantity

**Reference:**
- At fresh air temperature 28°C: room air 22°C / 50% RH, extract air 44°C
- At fresh air temperature 32°C: room air 26°C / 55% RH, extract air 28°C
- Fresh air ratio 10%

Table F10: TopVent® MC cooling capacities
3.7 Sound data

<table>
<thead>
<tr>
<th>Unit type</th>
<th>MC-6-C</th>
<th>MC-9-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound pressure level (at a distance of 5 m)</td>
<td>dB(A)</td>
<td>52</td>
</tr>
<tr>
<td>Total sound power level</td>
<td>dB(A)</td>
<td>74</td>
</tr>
<tr>
<td>Octave sound power level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63 Hz</td>
<td>dB</td>
<td>42</td>
</tr>
<tr>
<td>125 Hz</td>
<td>dB</td>
<td>60</td>
</tr>
<tr>
<td>250 Hz</td>
<td>dB</td>
<td>63</td>
</tr>
<tr>
<td>500 Hz</td>
<td>dB</td>
<td>66</td>
</tr>
<tr>
<td>1000 Hz</td>
<td>dB</td>
<td>68</td>
</tr>
<tr>
<td>2000 Hz</td>
<td>dB</td>
<td>68</td>
</tr>
<tr>
<td>4000 Hz</td>
<td>dB</td>
<td>67</td>
</tr>
<tr>
<td>8000 Hz</td>
<td>dB</td>
<td>62</td>
</tr>
</tbody>
</table>

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

Table F11: TopVent® MC sound power levels

3.8 Dimensions and weights

<table>
<thead>
<tr>
<th>Unit size</th>
<th>MC-6</th>
<th>MC-9</th>
<th>MC-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coils type</td>
<td>C</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>A</td>
<td>mm</td>
<td>900</td>
<td>1100</td>
</tr>
<tr>
<td>F</td>
<td>mm</td>
<td>758</td>
<td>882</td>
</tr>
<tr>
<td>G</td>
<td>mm</td>
<td>910</td>
<td>931</td>
</tr>
<tr>
<td>H</td>
<td>mm</td>
<td>832</td>
<td>853</td>
</tr>
<tr>
<td>I</td>
<td>mm</td>
<td>760</td>
<td>935</td>
</tr>
<tr>
<td>K</td>
<td>mm</td>
<td>1276</td>
<td>1318</td>
</tr>
<tr>
<td>L</td>
<td>mm</td>
<td>594</td>
<td>846</td>
</tr>
<tr>
<td>O × P</td>
<td>mm</td>
<td>420 × 850</td>
<td>500 × 1050</td>
</tr>
<tr>
<td>R</td>
<td>mm</td>
<td>2100</td>
<td>2190</td>
</tr>
<tr>
<td>T</td>
<td>mm</td>
<td>795</td>
<td>900</td>
</tr>
<tr>
<td>U</td>
<td>mm</td>
<td>1020</td>
<td>1220</td>
</tr>
<tr>
<td>J</td>
<td>*</td>
<td>Rp 1½ (internal)</td>
<td>Rp 1½ (internal)</td>
</tr>
<tr>
<td>M</td>
<td>*</td>
<td>G 1 (external)</td>
<td>G 1 (external)</td>
</tr>
<tr>
<td>Water content of heating/cooling coil</td>
<td>l</td>
<td>7.9</td>
<td>12.4</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>266</td>
<td>323</td>
</tr>
</tbody>
</table>

Table F12: TopVent® MC dimensions and weights
TopVent® MC

Fig. F13: TopVent® MC dimensional drawing

1 Return heating/cooling
2 Flow heating/cooling
3 Condensate connection
4 Access panel
4 Specification texts

4.1 TopVent® MC

Supply air unit for heating and cooling rooms up to 25 m in height with central heat and cold supply (2-pipe system); equipped with highly efficient air distributor; maximum floor area reached per unit 537 m² (size 6) and 946 m² respectively (size 9).

The unit consists of the following components:
- Fan unit
- Heating/cooling section
- Air-Injector
- Filter box
- Mixed air box
- Unit control box
- Optional components

TopVent® MC units comply with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of energy-related products. They are systems of the ‘fan coil unit’ type.

Fan unit

Consisting of radial fan with high-efficiency EC motor, backwards-curved, three-dimensional contoured blades and free-running rotor made of a high-performance composite material, aerodynamically optimised inflow nozzle, low-noise, with integrated overload protection (integrated in the heating/cooling section).

Heating/cooling section

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored polyurethane. The heating/cooling section contains:
- The highly efficient heating/cooling coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the hot water and cold water supply
- The pull-out condensate separator with collecting channel, made of high-quality corrosion-resistant material, with a downslope in all directions for rapid draining
- The condensate trap for connecting to a condensate drain (supplied).

Air-Injector

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored polyurethane, with:
- Vortex air distributor with concentric outlet nozzle, adjustable vanes and integrated absorber hood
- Actuator for infinitely variable adjustment of the air distribution from vertical to horizontal for draught-free air distribution in the hall under changing operating conditions
- Supply air temperature sensor

Filter box

Housing made of aluzinc sheet, internally insulated with EPDM, with 2 ISO coarse 60% bag filters (G4), with differential pressure switch for filter monitoring, factory-wired to the circuit board in the unit control box.

Mixed air box

Housing made of aluzinc sheet, internally insulated with EPDM, with fresh air damper and recirculation damper linked to move in opposite directions; includes actuator with spring return, factory-wired to the circuit board in the unit control box.

Unit control box

Control box fitted at the side of the housing for connection of the power supply and housing the control components that facilitate energy-optimised operation, controlled by the control system TopTronic® C. Housing made of coated sheet steel (light grey RAL 7035), protection rating IP 54. The following components are installed:
- Main switch
- Circuit board with all required electrical components, unit controller (clipped on) as well as connection terminals for the following external connections:
  - Heating/cooling valve
  - Heating/cooling pump
  - Return temperature sensor
  - Condensate pump
  - Forced off

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

Power supply and bus connection to be installed on site.
Options for the unit

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

Standard paint finish:
External paint finish in Hoval red (RAL 3000)

Paint finish as desired:
Choice of external paint finish in RAL colour

Hydraulic assembly diverting system:
Prefabricated assembly for hydraulic diverting system,
consisting of mixing valve, regulating valve, ball valve,
automatic air vent and screw connections for connection
to the unit and to the distributor circuit; mixing valve with
plug-in connection, sized for the coil in the unit and the Hoval
TopTronic® C control system.

Mixing valve:
Mixing valve with modulating rotary actuator and plug-in
connection, sized for the coil in the unit.

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

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

Return temperature sensor:
Temperature sensor for monitoring the heating medium.

4.2 TopTronic® C – System control

Zone-based control system ex-works for operation of decen-
tralised Hoval indoor climate systems with optimised use of
energy, suitable for demand-control of overall systems
comprising up to 64 control zones each with up to 15 supply
and extract air handling units or supply air units and 10 recir-
culation units.

The control system is customised and preconfigured ex
works. Zone allocation:

■ Zone 1: ___ x Unit type _________________
■ Zone 2: ___ x Unit type _________________
■ Zone 3: ___ x Unit type _________________
■ …

System structure:

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

Operation:

■ TopTronic® C-ST as system operator terminal: touch panel
for visualisation and control by web browser via HTML inter-
face, including software for LAN access
■ TopTronic® C-ZT as zone operator terminal: for simple
on-site operation of a control zone (optional)
■ Manual operating selector switch (optional)
■ Manual operating selector button (optional)
■ Operating of the units via building management system
via standardised interfaces (optional):
  – BACnet
  – Modbus IP
  – Modbus RTU

Control functions:

■ Control of the supply air temperature using room supply
air cascade control via sequential control of the energy
recovery and the coils (depending on the unit type)
■ Demand-driven control of the room air quality by varia-
tion of the supply air and exhaust air volume flows with
minimum and maximum limit (for supply and extract air
handling units, optional)
■ Control of the unit including the air distribution according
to the specifications of the zone controller

Alarms, protection:

■ Central alarm management with registration of all alarms
(timestamp, priority, status) in an alarm list and alarm
memory of the last 50 alarms; forwarding via e-mail can
be set in the parameters.
■ If there is a failure of communication, bus stations, sensor
systems or supply media, each part of the system transi-
tions to a protection mode which safeguards operation.
■ Frost protection control of the units with constrained
control of protection functions to prevent coil icing (for
supply air units as well as supply and extract air handling
units)
■ A maintenance mode implemented in the control algorithm
for testing all physical data points and alarms guarantees
high reliability.
**Options for the zone control panel:**
- Design for heating (TH, TC, THC, MH, MC, MHC)
- Design for cooling (TC, THC, MC, MHC)
- Cooling lock switch (TC, THC, MC, MHC)
- Alarm lamp
- Socket
- Additional room air temperature sensors (max. 3)
- Combination sensor room air quality, temperature and humidity
- External sensor values
- External set values
- Load shedding input
- Operating selector switch on terminal
- Operating selector button on terminal
- Power supply for air handling unit
- Safety relay
- Control of distributor pump, incl. power supply

**Control functions:**
- Control of the supply air temperature via sequential control of the coils
- Control of the unit including the air distribution according to the specifications of the zone controller

**Alarms, protection:**
- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (for supply air units)
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

**Options for the zone control panel:**
- Additional room air temperature sensors (max. 3)
- Operating of the units via building management system via standardised interfaces:
  - BACnet
  - Modbus IP
  - Modbus RTU

---

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

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

**System structure:**
- Unit controller: installed in the particular indoor climate unit
- Zone bus: as serial connection of all unit controllers with the zone controller; with robust bus protocol via shielded and twisted-pair bus line (bus cables provided by the client)
- Zone control panel, designed as compact cabinet for wall installation, made of coated sheet steel (light grey RAL 7035), with:
  - Zone controller with operating panel, making it simple to operate and monitor the system
  - Fresh air temperature sensor
  - Room temperature sensor
- Circuit board with external connections for:
  - Collective alarm
  - Forced off (zone controller)
  - Forced off (supply air unit)
  - Heating demand
  - Setpoint heating demand
  - Fault heat supply
  - Cooling demand
  - Fault cold supply
  - External enabling heating/cooling
  - External setting heating/cooling
  - Changeover valves heating/cooling
  - Additional room air temperature sensors (max. 3)
  - External setpoint fresh air ratio
  - Operating selector switch on terminal (digital)
TopVent® MHC

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

1 Use ................................................................. 66
2 Construction and operation ........................................ 66
3 Technical data .......................................................... 70
4 Specification texts ....................................................... 74
1 Use

1.1 Intended use

TopVent® MHC units are supply air units for ventilating, heating and cooling spaces up to 25 m in height with central heat and cold supply. They have the following functions:
- Heating (with connection to a hot water supply)
- Cooling (with connection to a water chiller)
- Fresh air supply
- Mixed air operation
- Recirculation operation
- Air distribution with adjustable Air-Injector
- Air filtration

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

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

1.2 User group

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

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

2 Construction and operation

2.1 Structure

The TopVent® MHC unit consists of the following components:
- Fan unit:
  - Diagonal fan with energy-saving EC motor, maintenance-free and infinitely variable
- Heating section:
  - contains the heating coil for heating the supply air with hot water
- Cooling section:
  - contains the cooling coil for cooling the supply air with cold water and the condensate separator for the condensate generated
- Air-Injector:
  - Patented, automatically adjustable vortex air distributor for draught-free air distribution over a large area
- Filter box:
  - contains 2 ISO Coarse 60 % bag filters (G4), easily accessible behind the sliding door
- Mixed air box:
  - contains fresh air damper and recirculation damper linked to move in opposite directions and actuator with spring return

As part of the TopTronic® C control system, the unit control box is an integral component. The following components are installed:
- Unit controller: this component controls the unit including the air distribution according to the specifications of the control zone. The unit controller is connected to the other components of the TopTronic® C control system via system bus.
- Main switch
- Circuit board with electrical components and external connections

All unit components are fully factory-wired.

Fig. G1: TopVent® MHC components
2.2 Function diagram

Fig. G2: TopVent® MHC structure

Fig. G3: TopVent® MHC function diagram
2.3 Operating modes

The TopVent® MHC has the following operating modes:

- Supply air speed 2
- Supply air speed 1
- Recirculation speed 1
- Recirculation speed 2
- Standby

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

- The operating mode of a control zone can be switched over manually.
- Each TopVent® MHC unit can operate individually in a local operating mode:
  - Off, Supply air speed 2, Supply air speed 1, Recirculation, Recirculation speed 1.

<table>
<thead>
<tr>
<th>Code</th>
<th>Operating mode</th>
<th>Description</th>
<th>Code</th>
<th>Operating mode</th>
<th>Description</th>
</tr>
</thead>
</table>
| SA2  | Supply air speed 2                  | Fan .......... speed 2  
                   Fresh air damper .......... 10 % open 1)  
                   Heating/cooling .......... on 2)  
                   1) Percentage is adjustable  
                   2) Depending on heat or cool demand | SA1  | Supply air speed 1                  | Fan .......... speed 1  
                   Fresh air damper .......... 10 % open 1)  
                   Heating/cooling .......... on 2)  
                   1) Percentage is adjustable  
                   2) Depending on heat or cool demand |
| REC  | Recirculation                       | Fan .......... speed 1/2  
                   Fresh air damper .......... closed  
                   Heating/cooling .......... on 1)  
                   1) Depending on heat or cool demand | DES  | Destratification:                  | Fan .......... speed 2  
                   To avoid heat build-up under the ceiling, it may be appropriate to switch on the fan when there is no heat or cool demand (either in permanent operation or in on/off operation depending on air temperature under the ceiling, as desired).  
                   Fresh air damper .......... closed  
                   Heating/cooling .......... off |
| REC1 | Recirculation speed 1               | Fan .......... speed 1  
                   Fresh air damper .......... closed  
                   Heating/cooling .......... on 1)  
                   1) Depending on heat or cool demand | DES  | Destratification:                  | Fan .......... speed 1  
                   The same as for REC, but the unit operates only at speed 1 (low air flow rate)  
                   Fresh air damper .......... closed  
                   Heating/cooling .......... off |
| ST   | Standby                             | The unit is normally switched off. The following functions remain active:  
                   Cooling protection:  
                   If the room temperature drops below the set value for cooling protection, the unit heats up the room in recirculation operation.  
                   Fresh air damper .......... closed  
                   Heating .......... on |
| CPR  |                                    | Fan .......... speed 2  
                   Fresh air damper .......... closed  
                   Heating .......... on |
| OPR  |                                    | Fan .......... speed 2  
                   Fresh air damper .......... closed  
                   Cooling .......... on |
| NCS  |                                    | Fan .......... speed 2  
                   Fresh air damper .......... open  
                   Heating/cooling .......... off |
### Table G4: TopVent® MHC operating modes

<table>
<thead>
<tr>
<th>Code</th>
<th>Operating mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L_OFF</td>
<td>Off (local operating mode)</td>
<td>The unit is switched off. Frost protection for the unit remains active. Fan .................................. off&lt;br&gt;Fresh air damper .............. closed&lt;br&gt;Heating/cooling .............. off</td>
</tr>
<tr>
<td>-</td>
<td>Forced heating</td>
<td>The unit draws in room air, warms it and blows it back into the room. Forced heating can be activated and set as required by the Hoval service technician. For example, it is suitable for heating the hall before taking the control system into operation or if the controller fails during the heating period. Fan .......................... speed 2 1)&lt;br&gt;Fresh air damper .............. closed 1)&lt;br&gt;Heating .......................... on 1)&lt;br&gt;1) Adjustable by the Hoval service technician</td>
</tr>
</tbody>
</table>
3 Technical data

3.1 Unit type reference

<table>
<thead>
<tr>
<th>Unit type</th>
<th>TopVent® MHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>TopVent® MHC</td>
<td>MHC - 6 A C</td>
</tr>
</tbody>
</table>

| Unit size          | 6 or 9       |

<table>
<thead>
<tr>
<th>Heating section</th>
<th>A with coil type A</th>
<th>B with coil type B</th>
<th>C with coil type C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling section</td>
<td>C with coil type C</td>
<td>D with coil type D</td>
<td></td>
</tr>
</tbody>
</table>

Further options

Table G5: TopVent® MHC unit type reference

3.2 Application limits

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Max.</th>
<th>°C</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Extract air temperature</td>
<td></td>
<td>max.</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Supply air temperature</td>
<td></td>
<td>max.</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Temperature of the heating medium 1)</td>
<td></td>
<td>max.</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Pressure of the heating medium</td>
<td></td>
<td>max.</td>
<td>kPa</td>
<td></td>
</tr>
<tr>
<td>Air flow rate</td>
<td>Size 6:</td>
<td>min.</td>
<td>m³/h</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Size 9:</td>
<td>min.</td>
<td>m³/h</td>
<td></td>
</tr>
<tr>
<td>Condensate quantity</td>
<td>Size 6:</td>
<td>max.</td>
<td>kg/h</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Size 9:</td>
<td>max.</td>
<td>kg/h</td>
<td></td>
</tr>
</tbody>
</table>

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

1) Design for higher temperatures on request

Table G6: TopVent® MHC application limits

3.3 Electrical connection

<table>
<thead>
<tr>
<th>Parameter</th>
<th>MHC-6</th>
<th>MHC-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>V AC</td>
<td>3 × 400</td>
</tr>
<tr>
<td>Permitted voltage tolerance</td>
<td>%</td>
<td>± 5</td>
</tr>
<tr>
<td>Frequency</td>
<td>Hz</td>
<td>50</td>
</tr>
<tr>
<td>Connected load</td>
<td>kW</td>
<td>3.6</td>
</tr>
<tr>
<td>Current consumption max.</td>
<td>A</td>
<td>5.9</td>
</tr>
<tr>
<td>Series fuse</td>
<td>A</td>
<td>13</td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP 54</td>
<td>IP 54</td>
</tr>
</tbody>
</table>

Table G7: TopVent® MHC electrical connection

3.4 Flow rate, product parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>MHC-6</th>
<th>MHC-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal air flow rate m³/h</td>
<td>6000</td>
<td>9000</td>
</tr>
<tr>
<td>Floor area covered m²</td>
<td>537</td>
<td>946</td>
</tr>
<tr>
<td>Static efficiency of the fans %</td>
<td>63.6</td>
<td>63.6</td>
</tr>
<tr>
<td>Effective electric power input kW</td>
<td>0.92</td>
<td>0.97</td>
</tr>
</tbody>
</table>

Table G8: TopVent® MHC technical data
### 3.5 Heat output

<table>
<thead>
<tr>
<th>Heating medium temperature</th>
<th>80/60 °C</th>
<th>60/40 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size Type</strong></td>
<td><strong>t_F</strong></td>
<td><strong>Q</strong></td>
</tr>
<tr>
<td>MHC-6</td>
<td>A - 5</td>
<td>33.1</td>
</tr>
<tr>
<td></td>
<td>- 15</td>
<td>33.8</td>
</tr>
<tr>
<td></td>
<td>B - 5</td>
<td>47.5</td>
</tr>
<tr>
<td></td>
<td>- 15</td>
<td>48.4</td>
</tr>
<tr>
<td></td>
<td>C - 5</td>
<td>76.8</td>
</tr>
<tr>
<td></td>
<td>- 15</td>
<td>78.2</td>
</tr>
<tr>
<td>MHC-9</td>
<td>A - 5</td>
<td>56.1</td>
</tr>
<tr>
<td></td>
<td>- 15</td>
<td>57.1</td>
</tr>
<tr>
<td></td>
<td>B - 5</td>
<td>71.9</td>
</tr>
<tr>
<td></td>
<td>- 15</td>
<td>73.3</td>
</tr>
<tr>
<td></td>
<td>C - 5</td>
<td>119.0</td>
</tr>
<tr>
<td></td>
<td>- 15</td>
<td>121.2</td>
</tr>
</tbody>
</table>

**Legend:**
- **Type** = Type of coil
- **t_F** = Fresh air temperature
- **Q** = Heat output
- **H_max** = Maximum mounting height
- **t_S** = Supply air temperature
- **ΔP_W** = Water pressure drop
- **m_W** = Water quantity
- **Q_m** = Condensate quantity

**Reference:**
- Room air 18 °C, extract air 20 °C / 20 % rel. humidity
- Fresh air ratio 10 %

### 3.6 Cooling capacities

<table>
<thead>
<tr>
<th>Cooling medium temperature</th>
<th>6/12 °C</th>
<th>8/14 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size Type</strong></td>
<td><strong>t_F</strong></td>
<td><strong>RH_F</strong></td>
</tr>
<tr>
<td>MHC-6</td>
<td>C 28</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>20.7</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>25.7</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>25.4</td>
</tr>
<tr>
<td>MHC-9</td>
<td>C 28</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>31.8</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>39.7</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>39.3</td>
</tr>
<tr>
<td>MHC-9</td>
<td>D 28</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>37.7</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>47.4</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>47.1</td>
</tr>
</tbody>
</table>

**Legend:**
- **Type** = Type of coil
- **t_F** = Fresh air temperature
- **RH_F** = Relative humidity of the fresh air
- **Q_sen** = Sensible cooling capacity
- **Q_tot** = Total cooling capacity
- **t_S** = Supply air temperature
- **ΔP_W** = Water pressure drop
- **m_W** = Water quantity

**Reference:**
- At fresh air temperature 28°C: room air 22°C / 50% RH, extract air 24°C
- At fresh air temperature 32°C: room air 26°C / 50% RH, extract air 28°C
- Fresh air ratio 10%
3.7 Sound data

<table>
<thead>
<tr>
<th>Unit type</th>
<th>MHC-6CC</th>
<th>MHC-9CC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound pressure level (at a distance of 5 m)</td>
<td>dB(A)</td>
<td>56</td>
</tr>
<tr>
<td>Total sound power level</td>
<td>dB(A)</td>
<td>77</td>
</tr>
<tr>
<td>Octave sound power level</td>
<td></td>
<td>63 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>125 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>250 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>500 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1000 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2000 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4000 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8000 Hz</td>
</tr>
</tbody>
</table>

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

Table G11: TopVent® MHC sound power levels

3.8 Dimensions and weights

<table>
<thead>
<tr>
<th>Unit size</th>
<th>MHC-6</th>
<th>MHC-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil type</td>
<td>AC</td>
<td>BC</td>
</tr>
<tr>
<td>A</td>
<td>mm</td>
<td>900</td>
</tr>
<tr>
<td>F</td>
<td>mm</td>
<td>758</td>
</tr>
<tr>
<td>G</td>
<td>mm</td>
<td>936</td>
</tr>
<tr>
<td>H</td>
<td>mm</td>
<td>858</td>
</tr>
<tr>
<td>I</td>
<td>mm</td>
<td>760</td>
</tr>
<tr>
<td>K</td>
<td>mm</td>
<td>1550</td>
</tr>
<tr>
<td>L</td>
<td>mm</td>
<td>594</td>
</tr>
<tr>
<td>O × P</td>
<td>mm</td>
<td>420 × 850</td>
</tr>
<tr>
<td>R</td>
<td>mm</td>
<td>2374</td>
</tr>
<tr>
<td>T</td>
<td>mm</td>
<td>1069</td>
</tr>
<tr>
<td>U</td>
<td>mm</td>
<td>1020</td>
</tr>
<tr>
<td>V</td>
<td>mm</td>
<td>1184</td>
</tr>
<tr>
<td>W</td>
<td>mm</td>
<td>1106</td>
</tr>
<tr>
<td>N</td>
<td>*</td>
<td>Rp 1¼ (internal)</td>
</tr>
<tr>
<td>J</td>
<td>*</td>
<td>Rp 1¼ (internal)</td>
</tr>
<tr>
<td>M</td>
<td>*</td>
<td>G 1 (external)</td>
</tr>
<tr>
<td>Water content of heating coil</td>
<td>l</td>
<td>4.6</td>
</tr>
<tr>
<td>Water content of cooling coil</td>
<td>l</td>
<td>7.9</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>295</td>
</tr>
</tbody>
</table>

Table G12: TopVent® MHC dimensions and weights
TopVent® MHC

Fig. G13: TopVent® MHC dimensional drawing

1 Return heating
2 Flow heating
3 Return cooling
4 Flow cooling
5 Condensate connection
6 Access panel
4 Specification texts

4.1 TopVent® MHC

Supply air unit for heating and cooling rooms up to 25 m in height with central heat and cold supply (4-pipe system); equipped with highly efficient air distributor; maximum floor area reached per unit 537 m² (size 6) and 946 m² respectively (size 9).

The unit consists of the following components:
- Fan unit
- Heating section
- Cooling section
- Air-Injector
- Filter box
- Mixed air box
- Unit control box
- Optional components

TopVent® MHC units comply with all the requirements of the Ecodesign Directive 2009/125/EC relating to environmentally friendly design of energy-related products. They are systems of the ‘fan coil unit’ type.

Fan unit

Consisting of radial fan with high-efficiency EC motor, backwards-curved, three-dimensional contoured blades and free-running rotor made of a high-performance composite material, aerodynamically optimised inflow nozzle, low-noise, with integrated overload protection (integrated in the cooling section).

Heating section

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with EPDM:
The heating section contains:
- The highly efficient heating coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the hot water supply

Cooling section

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored polyurethane.

The cooling section contains:
- The highly efficient heating/cooling coil consisting of seamless copper pipes with pressed-on, optimised and profiled aluminium fins and manifolds made of copper; for connection to the hot water supply
- The pull-out condensate separator with collecting channel, made of high-quality corrosion-resistant material, with a downslope in all directions for rapid draining
- The condensate trap for connecting to a condensate drain (supplied).

Air-Injector

Housing made of aluzinc sheet, air-tight, flame retardant, hygienic and easy to maintain because of ageing-resistant, silicone-free sealing materials, internally insulated with close-pored polyurethane, with:
- Vortex air distributor with concentric outlet nozzle, adjustable vanes and integrated absorber hood
- Actuator for infinitely variable adjustment of the air distribution from vertical to horizontal for draught-free air distribution in the hall under changing operating conditions
- Supply air temperature sensor

Filter box

Housing made of aluzinc sheet, internally insulated with EPDM, with 2 ISO coarse 60% bag filters (G4), with differential pressure switch for filter monitoring, factory-wired to the circuit board in the unit control box.

Mixed air box

Housing made of aluzinc sheet, internally insulated with EPDM, with fresh air damper and recirculation damper linked to move in opposite directions; includes actuator with spring return, factory-wired to the circuit board in the unit control box.

Unit control box

Control box fitted at the side of the housing for connection of the power supply and housing the control components that facilitate energy-optimised operation, controlled by the control system TopTronic® C. Housing made of coated sheet steel (light grey RAL 7035), protection rating IP 54. The following components are installed:
- Main switch
- Circuit board with all required electrical components, unit controller (clipped on) as well as connection terminals for the following external connections:
  - Heating/cooling valve
  - Heating/cooling pump
Options for the unit

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

Standard paint finish:
External paint finish in Hoval red (RAL 3000)

Paint finish as desired:
Choice of external paint finish in RAL colour

Hydraulic assembly diverting system:
Prefabricated assembly for hydraulic diverting system,
consisting of mixing valve, regulating valve, ball valve,
automatic air vent and screw connections for connection
to the unit and to the distributor circuit; mixing valve with
plug-in connection, sized for the coil in the unit and the Hoval
TopTronic® C control system.

Mixing valve:
Mixing valve with modulating rotary actuator and plug-in
connection, sized for the coil in the unit.

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

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

Return temperature sensor:
Temperature sensor for monitoring the heating medium.

4.2 TopTronic® C – System control

Zone-based control system ex-works for operation of decen-
tralised Hoval indoor climate systems with optimised use of
energy, suitable for demand-driven control of overall systems
comprising up to 64 control zones each with up to 15 supply
and extract air handling units or supply air units and 10 recir-
culation units.

The control system is customised and preconfigured ex
works. Zone allocation:
■ Zone 1: __ x Unit type __________________
■ Zone 2: __ x Unit type __________________
■ Zone 3: __ x Unit type __________________
■ …

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

Operation:
■ TopTronic® C-ST as system operator terminal: touch panel
  for visualisation and control by web browser via HTML inter-
  face, including software for LAN access
■ TopTronic® C-ZT as zone operator terminal: for simple
  on-site operation of a control zone (optional)
■ Manual operating selector switch (optional)
■ Manual operating selector button (optional)
■ Operating of the units via building management system
  via standardised interfaces (optional):
  – BACnet
  – Modbus IP
  – Modbus RTU

Control functions:
■ Control of the supply air temperature using room supply
  air cascade control via sequential control of the energy
  recovery and the coils (depending on the unit type)
■ Demand-driven control of the room air quality by varia-
tion of the supply air and exhaust air volume flows with
minimum and maximum limit (for supply and extract air
handling units, optional)
■ Control of the unit including the air distribution according
to the specifications of the zone controller
### Alarms, protection:
- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms; forwarding via e-mail can be set in the parameters.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (for supply air units as well as supply and extract air handling units)
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

### Options for the zone control panel:
- Design for heating (TH, TC, THC, MH, MC, MHC)
- Design for cooling (TC, THC, MC, MHC)
- Cooling lock switch (TC, THC, MC, MHC)
- Alarm lamp
- Socket
- Additional room air temperature sensors (max. 3)
- Combination sensor room air quality, temperature and humidity
- External sensor values
- External set values
- Load shedding input
- Operating selector switch on terminal
- Operating selector button on terminal
- Power supply for air handling unit
- Safety relay
- Control of distributor pump, incl. power supply

### Control functions:
- Control of the supply air temperature via sequential control of the coils
- Control of the unit including the air distribution according to the specifications of the zone controller

### Alarms, protection:
- Central alarm management with registration of all alarms (timestamp, priority, status) in an alarm list and alarm memory of the last 50 alarms.
- If there is a failure of communication, bus stations, sensor systems or supply media, each part of the system transitions to a protection mode which safeguards operation.
- Frost protection control of the units with constrained control of protection functions to prevent coil icing (for supply air units)
- A maintenance mode implemented in the control algorithm for testing all physical data points and alarms guarantees high reliability.

### Options for the zone control panel:
- Additional room air temperature sensors (max. 3)
- Operating of the units via building management system via standardised interfaces:
  - BACnet
  - Modbus IP
  - Modbus RTU

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

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

### System structure:
- Unit controller: installed in the particular indoor climate unit
- Zone bus: as serial connection of all unit controllers with the zone controller; with robust bus protocol via shielded and twisted-pair bus line (bus cables provided by the client)
- Zone control panel, designed as compact cabinet for wall installation, made of coated sheet steel (light grey RAL 7035), with:
  - Zone controller with operating panel, making it simple to operate and monitor the system
  - Fresh air temperature sensor
<table>
<thead>
<tr>
<th>Options</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Unit type reference</td>
<td>78</td>
</tr>
<tr>
<td>2 Outlet nozzle</td>
<td>82</td>
</tr>
<tr>
<td>3 Suspension set</td>
<td>82</td>
</tr>
<tr>
<td>4 Air filtration</td>
<td>82</td>
</tr>
<tr>
<td>5 Paint finish</td>
<td>83</td>
</tr>
<tr>
<td>6 Recirculation silencer</td>
<td>83</td>
</tr>
<tr>
<td>7 Acoustic cowl</td>
<td>83</td>
</tr>
<tr>
<td>8 Hydraulic assembly diverting system</td>
<td>84</td>
</tr>
<tr>
<td>9 Mixing valve</td>
<td>86</td>
</tr>
<tr>
<td>10 Condensate pump</td>
<td>86</td>
</tr>
<tr>
<td>11 Return temperature sensor</td>
<td>86</td>
</tr>
<tr>
<td>12 Pump control for mixing or injection system</td>
<td>87</td>
</tr>
</tbody>
</table>
1 Unit type reference

1.1 Type code for recirculation units

<table>
<thead>
<tr>
<th>Availability</th>
<th>Unit type</th>
<th>Unit size</th>
<th>Heating section</th>
<th>Heating/cooling section</th>
<th>Design</th>
<th>Air outlet</th>
<th>Installation</th>
<th>Filter box</th>
<th>Paint finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>THC - 9 B C / ST . D1 / S . FK . LH . UA / Y . KP / TC . - . PP . RF</td>
<td>TH Recirculation unit with heating section</td>
<td>6 Size 6</td>
<td>- without heating section</td>
<td>- without heating/cooling section</td>
<td>ST Standard</td>
<td>D1 Design with 1 Air-Injector</td>
<td>- without</td>
<td>-- without</td>
<td>-- without</td>
</tr>
<tr>
<td></td>
<td>TC Recirculation unit with heating/cooling section</td>
<td>9 Size 9</td>
<td>A with coil type A</td>
<td>C with coil type C</td>
<td></td>
<td>DN Outlet nozzle</td>
<td>S Suspension set</td>
<td>FK Filter box</td>
<td>LH Standard paint finish</td>
</tr>
<tr>
<td></td>
<td>THC Recirculation unit with heating and cooling section</td>
<td></td>
<td>B with coil type B</td>
<td>D with coil type D</td>
<td></td>
<td></td>
<td></td>
<td>FF Flat filter box</td>
<td>LU Paint finish as desired</td>
</tr>
</tbody>
</table>
### Availability

<table>
<thead>
<tr>
<th>THC - 9</th>
<th>B</th>
<th>C</th>
<th>ST</th>
<th>D1</th>
<th>S</th>
<th>FK</th>
<th>LH</th>
<th>UA</th>
<th>Y</th>
<th>KP</th>
<th>TC</th>
<th>-</th>
<th>PP</th>
<th>RF</th>
</tr>
</thead>
</table>

#### Silencer
- **without**
- **U** - Recirculation silencer
- **-A** - Acoustic cowl
- **UA** - Recirculation silencer and acoustic cowl

#### Hydraulics
- **without**
- **Y** - Hydraulic assembly diverting system
- **M** - Mixing valve

#### Condensate pump
- **without**
- **KP** - Condensate pump

#### Control system
- **TC** - TopTronic® C
- **KK** - Terminal box design

#### Pump control
- **without**
- **PH** - Heating pump
- **PK** - Heating or cooling pump
- **PP** - Heating pump and cooling pump

#### Return temperature sensor
- **without**
- **RF** - Return temperature sensor

---

Table H1: Type code and availability of recirculation units
1.2 Type code for supply air units

**Availability**

- MHC - 9 B C / ST / D1 / S / -- / LH / A / Y / KP / TC / PP RF

**Unit type**

- MH: Supply air unit with heating section
- MC: Supply air unit with heating/cooling section
- MHC: Supply air unit with heating and cooling section

**Unit size**

- 6: Size 6
- 9: Size 9

**Heating section**

- - without heating section
- A: with coil type A
- B: with coil type B
- C: with coil type C

**Heating/cooling section**

- - without heating/cooling section
- C: with coil type C
- D: with coil type D

**Design**

- ST: Standard

**Air outlet**

- D1: Design with 1 Air-Injector

**Installation**

- - without
- S: Suspension set

**Reserve**

**Paint finish**

- -- without
- LH: Standard paint finish
- LU: Paint finish as desired

**Silencer**

- -- without
- A: Acoustic cowl

**Hydraulics**

- - without
- Y: Hydraulic assembly diverting system
- M: Mixing valve
### Options

#### Table H2: Type code and availability of supply air units

<table>
<thead>
<tr>
<th>Availability</th>
<th>Condensate pump</th>
<th>Control system</th>
<th>Pump control</th>
<th>Return temperature sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>MHC</td>
<td>● ● ●</td>
<td>● ● ●</td>
<td>● ● ● PH</td>
<td>● ● ● RF</td>
</tr>
<tr>
<td>B</td>
<td>without</td>
<td>TC TopTronic® C</td>
<td>without</td>
<td>without</td>
</tr>
<tr>
<td>C</td>
<td>KP Condensate pump</td>
<td></td>
<td>PH Heating pump</td>
<td>RF Return temperature sensor</td>
</tr>
<tr>
<td>D1</td>
<td>S</td>
<td>TC TopTronic® C</td>
<td>PK Heating or cooling pump</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td></td>
<td>PP Heating pump and cooling pump</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MHC**: 9 B C / ST / D1 / S / -- / LH / A / Y / KP / TC / PP / RF
2 Outlet nozzle

For low-cost recirculation heating in spaces where comfort requirements are relatively low the TopVent® TH unit is available with a simple outlet nozzle. The air discharge angle cannot be adjusted. For example, the unit is well-suited for use in high-bay warehouses.

The outlet nozzle replaces the vortex air distributor Air-Injector. The external dimensions of the unit remain the same. The weight is reduced:
- Size 6......... -15 kg
- Size 9......... -21 kg

![TopVent® TH with outlet nozzle](image)

3 Suspension set

A suspension set is available to make it easy to install the units on the ceiling. The set consists of 4 pairs of U-profiles made of Aluzinc sheet metal and is height-adjustable up to 1300 mm.

![Suspension set](image)

4 Air filtration

For hygiene reasons, Hoval recommends always fitting TopVent® units with a filter.

4.1 Filter box

A filter box with 2 bag filters can be installed 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.

**Notice**

In the planning phase make sure there is enough space in front of the sliding doors so that the filters can be replaced with ease.

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

![Filter box technical data](image)

<table>
<thead>
<tr>
<th>Size</th>
<th>6</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>mm</td>
<td>900</td>
</tr>
<tr>
<td>B</td>
<td>mm</td>
<td>400</td>
</tr>
<tr>
<td>Filter class</td>
<td>ISO coarse 60% (G4)</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>20</td>
</tr>
<tr>
<td>Factory setting of differential pressure switches</td>
<td>Pa</td>
<td>180</td>
</tr>
</tbody>
</table>

Table H5: Filter box technical data
4.2 Flat filter box

A flat filter box with 4 pleated cell filters can be installed for the purpose of filtering the recirculation air. A pressure difference control device is installed for automatic monitoring of the filter. It shows when the filters have to be cleaned or changed.

<table>
<thead>
<tr>
<th>Size</th>
<th>6</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>A mm</td>
<td>900</td>
<td>1100</td>
</tr>
<tr>
<td>B mm</td>
<td>140</td>
<td>165</td>
</tr>
</tbody>
</table>

Filter class ISO coarse 60% (G4)
Weight kg 10 12.5
Factory setting of differential pressure switches Pa 50 50

Table H6: Flat filter box technical data

5 Paint finish

If the customer wishes, the units can be provided with an exterior paint finish. There are 2 possibilities:
- Standard paint finish in Hoval red (RAL 3000)
- Paint finish in desired RAL colour

6 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 appliance and thus reduces the sound reflection from the ceiling. Insertion attenuation is 3 dB (A) compared with the total sound power level of each TopVent® unit. Mount the recirculation units as usual via the 4 fastening points in the heating or heating/cooling section (for example, using the optional suspension set).

Caution
Risk of injury from falling parts. The silencer cannot bear the weight of the appliance. Do not locate any suspension points on the silencer.

<table>
<thead>
<tr>
<th>Size</th>
<th>6</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>A mm</td>
<td>900</td>
<td>1100</td>
</tr>
<tr>
<td>B mm</td>
<td>380</td>
<td>485</td>
</tr>
</tbody>
</table>

Weight kg 15 20

Table H7: Dimensions and weights of the recirculation silencers

7 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. Insertion attenuation is 4 dB compared with the total sound power level of each TopVent® unit.
8 Hydraulic assembly diverting system

Assemblies for hydraulic diverting, which are optimally matched to the units, are available for easy installation of TopVent® units. Please note the following:
- Install the assembly horizontally.
- Mount the assembly so that its weight does not need to be absorbed by the coil.
- Insulate the assembly.

Default settings for the hydraulic alignment
Read off the default settings from Fig. H8. 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 drops. Thus, only consider the pressure drops of the distributor circuit up to the screw connections.

### Pressure drop in kPa

![Pressure drop in kPa](image)

### Water flow rate in l/h

![Water flow rate in l/h](image)

Fig. H8: Default settings for the balancing valves
Table H10: Dimensions (in mm) and valves of the hydraulic assembly

<table>
<thead>
<tr>
<th>Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Mixing valve</th>
<th>Control valve</th>
<th>Screw joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y-6AB</td>
<td>758</td>
<td>78</td>
<td>726</td>
<td>853</td>
<td>300</td>
<td>NRQ24A-SR</td>
<td>STAD DN32</td>
<td>1 1/4&quot;</td>
</tr>
<tr>
<td>Y-6C</td>
<td>758</td>
<td>78</td>
<td>745</td>
<td>853</td>
<td>300</td>
<td>NRQ24A-SR</td>
<td>STAD DN32</td>
<td>1 1/4&quot;</td>
</tr>
<tr>
<td>Y-9AB</td>
<td>882</td>
<td>78</td>
<td>770</td>
<td>977</td>
<td>320</td>
<td>NRQ24A-SR</td>
<td>STAD DN40</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>Y-9C</td>
<td>882</td>
<td>78</td>
<td>791</td>
<td>977</td>
<td>320</td>
<td>NRQ24A-SR</td>
<td>STAD DN40</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>Y-9D</td>
<td>882</td>
<td>95</td>
<td>840</td>
<td>977</td>
<td>340</td>
<td>NRQ24A-SR</td>
<td>STAD DN50</td>
<td>2&quot;</td>
</tr>
</tbody>
</table>

Table H11: Electrical data of mixing valves

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>24 VAC/DC</td>
</tr>
<tr>
<td>Nominal voltage frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Power consumption for wire sizing</td>
<td>23 VA</td>
</tr>
<tr>
<td>Control signal Y</td>
<td>0...10 VDC</td>
</tr>
<tr>
<td>Operating range Y</td>
<td>2...10 VDC</td>
</tr>
<tr>
<td>Position response U</td>
<td>2...10 VDC</td>
</tr>
<tr>
<td>Actuator run time</td>
<td>9 s / 90°</td>
</tr>
</tbody>
</table>

Fig. H9: Dimensional drawing for hydraulic assembly
9 Mixing valve

Mixing valves, which are optimally matched to the units, are available for easy installation of TopVent® units. They have the following specifications:

- 3-way mixing valve with modulating rotary actuator (run time 9 s)
- Flow characteristic:
  - Equal percentage control path
  - Linear bypass
- Integrated position control and response

![Diagram of mixing valve]

<table>
<thead>
<tr>
<th>Type</th>
<th>DN</th>
<th>kvs</th>
<th>DA</th>
<th>DI</th>
<th>L</th>
<th>H</th>
<th>M</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-6AB</td>
<td>20</td>
<td>6.3</td>
<td>G 1½</td>
<td>Rp ¾</td>
<td>86</td>
<td>46</td>
<td>42</td>
<td>220</td>
<td>90</td>
</tr>
<tr>
<td>M-6C</td>
<td>25</td>
<td>10</td>
<td>G 1½</td>
<td>Rp 1</td>
<td>85</td>
<td>46</td>
<td>45</td>
<td>220</td>
<td>90</td>
</tr>
<tr>
<td>M-9AB</td>
<td>25</td>
<td>10</td>
<td>G 1½</td>
<td>Rp 1</td>
<td>85</td>
<td>46</td>
<td>45</td>
<td>220</td>
<td>90</td>
</tr>
<tr>
<td>M-9C</td>
<td>32</td>
<td>10</td>
<td>G 1½</td>
<td>Rp 1½</td>
<td>104</td>
<td>46</td>
<td>56</td>
<td>220</td>
<td>90</td>
</tr>
<tr>
<td>M-9D</td>
<td>40</td>
<td>16</td>
<td>G 2½</td>
<td>Rp 1½</td>
<td>115</td>
<td>51</td>
<td>56</td>
<td>230</td>
<td>90</td>
</tr>
</tbody>
</table>

Table H12: Dimensions mixing valves

<table>
<thead>
<tr>
<th>Type</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-6AB</td>
<td>2.6 kg</td>
</tr>
<tr>
<td>M-6C</td>
<td>3.1 kg</td>
</tr>
<tr>
<td>M-9AB</td>
<td>3.1 kg</td>
</tr>
<tr>
<td>M-9C</td>
<td>4.0 kg</td>
</tr>
<tr>
<td>M-9D</td>
<td>4.7 kg</td>
</tr>
</tbody>
</table>

Table H13: Weights mixing valves (in kg)

<table>
<thead>
<tr>
<th>Electrical data of the mixing valves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
</tr>
<tr>
<td>Nominal voltage frequency</td>
</tr>
<tr>
<td>Power consumption for wire sizing</td>
</tr>
<tr>
<td>Control signal Y</td>
</tr>
<tr>
<td>Operating range Y</td>
</tr>
<tr>
<td>Position response U</td>
</tr>
<tr>
<td>Actuator run time</td>
</tr>
</tbody>
</table>

Table H14: Electrical data of NRQ24A-SR mixing valves

10 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 is installed directly under the condensate drain connection; the supplied container is prepared for installation on the Air-Injector. It pumps the condensate through a flexible hose to a delivery head of 3 m, thus enabling discharge of the condensate
- through waste water pipes directly below the ceiling,
- onto the roof.

Flow rate (at 3 m delivery head) | l/h | max. 150
Tank capacity                  | l   | max. 1.9
Dimensions (L x W x H)         | mm  | 288 x 127 x 178
Weight                        | kg  | 2.4

Table H15: Technical data condensate pump

11 Return temperature sensor

The return temperature sensor monitors the return temperature of the heating medium.
12. Pump control for mixing or injection system

Instead of the diverting system, an injection or mixing circuit can also be installed in the load circuit.

Please note the following:
- Not only the mixing valves but also the pumps in the load circuit are controlled directly by the control block.
- Terminals for wiring the mixing valves and the pumps in the load circuit are located in the connection box.
- Make sure that valves and pumps which meet the following requirements are provided on site.

12.1 Requirements for mixing valves

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

12.2 Requirements for pumps

- Voltage ........... 230 VAC
- Current ........... up to 4.0 A
Fig. H17: Schematic diagram for injection system TopVent® TH / MH

1. Unit control box
2. Zone bus
3. Power supply for TopVent®
4. Heating pump
5. Mixing valve
6. Power supply control panel
7. Collective alarm
8. Fresh air temperature sensor
9. Room temperature sensor
10. Fault heat supply
11. Distributor pump
12. System operator terminal
13. Zone control panel
14. Heating demand
15. Heating control panel
Fig. H18: Schematic diagram for injection system TopVent® TC / MC

1. Unit control box
2. Zone bus
3. Power supply for TopVent®
4. Heating/cooling pump
5. Mixing valve
6. Power supply control panel
7. Collective alarm
8. Fresh air temperature sensor
9. Room temperature sensor
10. Fault heat supply
11. Fault cold supply
12. Distributor pump
13. System operator terminal
14. Zone control panel
15. Cooling lock switch
16. Heating demand
17. Cooling demand
18. Heating control panel
19. Changeover valves heating/cooling
20. Heating circuit
21. Cooling circuit
Fig. H19: Schematic diagram for injection system TopVent® THC / MHC

1 Unit control box
2 Zone bus
3 Power supply for TopVent®
4 Cooling pump
5 Heating pump
6 Mixing valve cooling
7 Mixing valve heating
8 Power supply control panel
9 Collective alarm
10 Fresh air temperature sensor
11 Room temperature sensor
12 Fault heat supply
13 Fault cold supply
14 Distributor pump heating
15 Distributor pump cooling
16 System operator terminal
17 Zone control panel
18 Cooling lock switch
19 Heating demand
20 Cooling demand
21 Heating control panel
22 Heating circuit
23 Cooling circuit
Transport and installation

1 Installation ................................................................. 92
2 Hydraulic installation ................................................... 93
3 Electrical installation .................................................... 97
# Installation

## 1.1 Preparation

The following guidelines are important when preparing for installation:
- The scope of delivery includes:
  - TopVent® unit, delivered on a pallet
  - Accessories (installation material, trap, temperature sensor)
  - Optional components

**TopVent® unit**
- Make sure that a lifting platform is available.
- Only secure the unit to ceilings with sufficient load-bearing capacity.
- For the purposes of installation the unit is provided with 4 M10 rivet nuts with hexagon bolts and washers.
  - Fasten the unit to the ceiling by means of the optional suspension set or by means of flat iron bars, perforated bars, angles, steel cables or similar.
  - Do not use eyebolts.

## 1.2 Positioning

- Comply with the minimum and maximum distances.
- All air inlet and air outlet openings must be freely accessible. The supply air jet must be free to spread out unhindered.
- The access panels in the unit must be freely accessible.
- Clearance of at least 0.9 m is required for maintenance work around the heating/cooling section.

![Diagram](image)

<table>
<thead>
<tr>
<th>Size</th>
<th>6</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit clearance X</td>
<td>min.</td>
<td>m</td>
</tr>
<tr>
<td></td>
<td>max.</td>
<td>m</td>
</tr>
<tr>
<td>Distance from ceiling Z</td>
<td>min.</td>
<td>m</td>
</tr>
<tr>
<td>Mounting height Y</td>
<td>min.</td>
<td>m</td>
</tr>
<tr>
<td></td>
<td>max.</td>
<td>m</td>
</tr>
</tbody>
</table>

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

## 1.3 Unit installation

Proceed as follows to position the unit:
- Transport the unit to the installation site and rotate it to the correct position.
- Fasten the unit to the designated suspension points.
- Connect supply air units to a fresh air duct via a canvas connection and connect both flanges with an earth wire.
2 Hydraulic installation

2.1 Heating/cooling coil

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

Requirements for the boiler system and the distributor circuit
- Hydraulically coordinate the pipework for the individual units within a control zone to ensure even distribution.
- The heating medium must be available at the mixing valve without delay in the required amount and temperature.
- The condensate separator in cooling units only functions while the fan is running. No coolant must be allowed to circulate in the coil when the unit is switched off.
- Depending on local conditions, check whether compensators for linear expansion are required for the supply and return lines and/or articulated connections are required for the units.
- Do not fasten any loads to the coil, e.g. by means of the flow or return lines.
- Insulate the hydraulic lines.

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

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

Notice
Use the 'Hydraulic assembly' or 'Mixing valve' options for quick and easy hydraulic installation.

2.2 Condensate connection

Condensate arising in cooling units must be removed via a condensate-proof line.
- Install and insulate the supplied trap on the condensate connection of the unit.
- Dimension the slope and cross-section of the condensate line so that no condensate backflow takes place.
- Make sure that the condensate produced is drained in compliance with local regulations.
- Route the condensate line from the pump directly upwards.

Notice
Use the 'Condensate pump' option for quick and easy hydraulic installation.

Fig. I2: Condensate line
Fig. I3: Conceptual drawing for hydraulic diverting system TopVent® TH / MH
Fig. I4: Conceptual drawing for hydraulic diverting system TopVent® TC / MC

1 Unit control box
2 Zone bus
3 Power supply for TopVent®
4 Mixing valve
5 Power supply control panel
6 Collective alarm
7 Fresh air temperature sensor
8 Room temperature sensor
9 Fault heat supply
10 Fault cold supply
11 Distributor pump
12 System operator terminal
13 Zone control panel
14 Cooling lock switch
15 Heating demand
16 Cooling demand
17 Heating control panel
18 Changeover valves heating/cooling
19 Heating circuit
20 Cooling circuit

< 2 m

Transport and installation
Fig. I5: Conceptual drawing for hydraulic diverting system TopVent® THC / MHC

1 Unit control box
2 Zone bus
3 Power supply for TopVent®
4 Mixing valve heating
5 Mixing valve cooling
6 Power supply control panel
7 Collective alarm
8 Fresh air temperature sensor
9 Room temperature sensor
10 Fault heat supply
11 Fault cold supply
12 Distributor pump heating
13 Distributor pump cooling
14 System operator terminal
15 Zone control panel
16 Cooling lock switch
17 Heating demand
18 Cooling demand
19 Heating control panel
20 Heating circuit
21 Cooling circuit

Transport and installation

Hydraulic installation
3 Electrical installation

- The electrical installation must only be carried out by a qualified electrician.
- Observe the relevant regulations (e.g. EN 60204-1).
- Choose the dimensions of the cable cross sections in line with the applicable regulations.
- Route signal and bus lines separately from mains cables.
- Make sure the lightning protection system for the units or for the entire building is planned and carried out by professionals.
- Provide overload protection equipment on site in the mains connection line of the zone control panel.

**Attention**
Use an all-pole sensitive residual current circuit breaker for a leakage current protective circuit.

- Carry out the electrical installation according to the wiring diagram:
  – Power supply for TopVent®
  – Zone bus based on system layout
  – Signal lines
- Connect optional components to the unit control box (condensate pump, return temperature sensor, mixing valve, pump).
## Electrical Installation

<table>
<thead>
<tr>
<th>Component</th>
<th>Designation</th>
<th>Voltage</th>
<th>Cable</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TopTronic® C</strong>&lt;br&gt;System control</td>
<td>Power supply</td>
<td>3 × 400 V AC</td>
<td>NYM-J</td>
<td>5 × … mm²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 × 230 V AC</td>
<td>NYM-J</td>
<td>3 × … mm²</td>
</tr>
<tr>
<td></td>
<td>Zone bus</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
<td>max. 1000 m length</td>
</tr>
<tr>
<td></td>
<td>System bus</td>
<td>Ethernet</td>
<td>≥ CAT 5</td>
<td>For connecting several zone control panels</td>
</tr>
<tr>
<td></td>
<td>Integration into the building management system</td>
<td>Ethernet</td>
<td>≥ CAT 5</td>
<td>BACnet, Modbus IP</td>
</tr>
<tr>
<td></td>
<td>Room temperature sensor</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
<td>max. 250 m</td>
</tr>
<tr>
<td></td>
<td>Fresh air temperature sensor</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
<td>max. 250 m</td>
</tr>
<tr>
<td></td>
<td>Additional room air temperature sensors</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
<td>max. 250 m</td>
</tr>
<tr>
<td></td>
<td>Combination sensor room air quality, temperature and humidity</td>
<td>J-Y(Si)Y</td>
<td>4 × 2 × 0.8 mm</td>
<td>max. 250 m</td>
</tr>
<tr>
<td></td>
<td>Heating demand</td>
<td>Volt-free</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>max. 230 V AC</td>
<td>max. 24 VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Setpoint heating demand</td>
<td>0-10 V DC</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
</tr>
<tr>
<td></td>
<td>Cooling demand</td>
<td>Volt-free</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>max. 230 V AC</td>
<td>max. 24 VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fault heat supply</td>
<td>24 V AC</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Fault cold supply</td>
<td>24 V AC</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Collective alarm</td>
<td>Volt-free</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>max. 230 V AC</td>
<td>max. 24 VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Distributor pump heat supply</td>
<td>3 × 400 V AC</td>
<td>NYM-J</td>
<td>4 × 1.5 mm² (min.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 × 230 V AC</td>
<td>NYM-J</td>
<td>3 × 1.5 mm² (min.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NYM-O</td>
<td>4 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Distributor pump cold supply</td>
<td>3 × 400 V AC</td>
<td>NYM-J</td>
<td>4 × 1.5 mm² (min.)</td>
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<td></td>
<td>1 × 230 V AC</td>
<td>NYM-J</td>
<td>3 × 1.5 mm² (min.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NYM-O</td>
<td>4 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Power supply for units</td>
<td>3 × 400 V AC</td>
<td>NYM-J</td>
<td>5 × 1.5 mm² (min.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 × 400 V AC</td>
<td>NYM-J</td>
<td>5 × 4.0 mm² (min.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 × 400 V AC</td>
<td>NYM-J</td>
<td>5 × 1.5 mm² (min.)</td>
</tr>
<tr>
<td></td>
<td>System operator terminal (if external)</td>
<td>24 V AC</td>
<td>NYM-J</td>
<td>3 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ethernet</td>
<td>≥ CAT 5</td>
</tr>
<tr>
<td></td>
<td>Zone operator terminal (if external)</td>
<td>24 V AC</td>
<td>J-Y(Si)Y</td>
<td>4 × 2 × 0.8 mm</td>
</tr>
<tr>
<td></td>
<td>External sensor values</td>
<td>0-10 V DC</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
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<tr>
<td></td>
<td>External set values</td>
<td>0-10 V DC</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
</tr>
<tr>
<td></td>
<td>Load shedding input</td>
<td>24 V AC</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
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<tr>
<td></td>
<td>Operating selector switch on terminal (analogue)</td>
<td>0-10 V DC</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
</tr>
<tr>
<td></td>
<td>Operating selector switch on terminal (digital)</td>
<td>0-10 V DC</td>
<td>J-Y(Si)Y</td>
<td>5 × 2 × 0.8 mm</td>
</tr>
<tr>
<td></td>
<td>Operating selector button on terminal</td>
<td>24 V AC</td>
<td>J-Y(Si)Y</td>
<td>5 × 2 × 0.8 mm</td>
</tr>
<tr>
<td></td>
<td>Forced off</td>
<td>24 V AC</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>External enabling/setting heating/cooling</td>
<td></td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Changeover valve flow</td>
<td>24 V AC</td>
<td>NYM-O</td>
<td>7 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Changeover valve return</td>
<td>24 V AC</td>
<td>NYM-O</td>
<td>7 × 1.5 mm²</td>
</tr>
</tbody>
</table>
### Transport and installation

#### Electrical installation

<table>
<thead>
<tr>
<th>Component</th>
<th>Designation</th>
<th>Voltage</th>
<th>Cable</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TopTronic® C</strong>&lt;br&gt;System control for TopVent® C-SYS&lt;br&gt;Zone control panel</td>
<td>Power supply</td>
<td>1 × 230 V AC</td>
<td>NYM-J</td>
<td>3 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Zone bus</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
<td>max. 1000 m length</td>
</tr>
<tr>
<td></td>
<td>Integration into the building management system</td>
<td>Ethernet ≥ CAT 5</td>
<td>BACnet, Modbus IP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Room temperature sensor</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
<td>max. 250 m</td>
</tr>
<tr>
<td></td>
<td>Fresh air temperature sensor</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
<td>max. 250 m</td>
</tr>
<tr>
<td></td>
<td>Additional room air temperature sensors</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
<td>max. 250 m</td>
</tr>
<tr>
<td></td>
<td>Heating demand</td>
<td>Volt-free</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>max. 230 V AC</td>
<td>max. 24 V DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Setpoint heating demand</td>
<td>0-10 VDC</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
</tr>
<tr>
<td></td>
<td>Cooling demand</td>
<td>Volt-free</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
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<tr>
<td></td>
<td>max. 230 V AC</td>
<td>max. 24 V DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fault heat supply</td>
<td>24 VAC</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Fault cold supply</td>
<td>24 VAC</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Collective alarm</td>
<td>Volt-free</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>max. 230 V AC</td>
<td>max. 24 V DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>External setpoint fresh air ratio</td>
<td>0-10 VDC</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
</tr>
<tr>
<td></td>
<td>Operating selector switch on terminal (digital)</td>
<td>0-10 VDC</td>
<td>J-Y(Si)Y</td>
<td>5 × 2 × 0.8 mm</td>
</tr>
<tr>
<td></td>
<td>Operating selector button on terminal</td>
<td>24 VAC</td>
<td>J-Y(Si)Y</td>
<td>5 × 2 × 0.8 mm</td>
</tr>
<tr>
<td></td>
<td>Forced off</td>
<td>24 VAC</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>External enabling/setting heating/cooling</td>
<td>24 VAC</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Changeover valve flow</td>
<td>24 VAC</td>
<td>NYM-O</td>
<td>7 × 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>Changeover valve return</td>
<td>24 VAC</td>
<td>NYM-O</td>
<td>7 × 1.5 mm²</td>
</tr>
</tbody>
</table>

#### TopVent®<br>Ventilation unit

<table>
<thead>
<tr>
<th>Component</th>
<th>Designation</th>
<th>Voltage</th>
<th>Cable</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>3 × 400 V AC</td>
<td>NYM-J</td>
<td>5 × 1.5 mm² (min.)</td>
<td>min. 7 m length</td>
</tr>
<tr>
<td>Zone bus</td>
<td>J-Y(Si)Y</td>
<td>2 × 2 × 0.8 mm</td>
<td>max. 1000 m length</td>
<td></td>
</tr>
<tr>
<td>Mixing valve heating</td>
<td>24 VAC</td>
<td>NYM-O</td>
<td>4 × 1.0 mm²</td>
<td>with Hydraulic assembly or Mixing valve option: cable connected to the mixing valve</td>
</tr>
<tr>
<td>Mixing valve cooling</td>
<td>24 VAC</td>
<td>NYM-O</td>
<td>4 × 1.0 mm²</td>
<td>with Hydraulic assembly or Mixing valve option: cable connected to the mixing valve</td>
</tr>
<tr>
<td>Heating pump</td>
<td>230 VAC</td>
<td>NYM-J</td>
<td>3 × 1.5 mm²</td>
<td>Power supply</td>
</tr>
<tr>
<td></td>
<td>24 VAC</td>
<td>NYM-O</td>
<td>4 × 1.0 mm²</td>
<td>Control line</td>
</tr>
<tr>
<td>Cooling pump</td>
<td>230 VAC</td>
<td>NYM-J</td>
<td>3 × 1.5 mm²</td>
<td>Power supply</td>
</tr>
<tr>
<td></td>
<td>24 VAC</td>
<td>NYM-O</td>
<td>4 × 1.0 mm²</td>
<td>Control line</td>
</tr>
<tr>
<td>Forced off</td>
<td>24 VAC</td>
<td>NYM-O</td>
<td>2 × 1.5 mm²</td>
<td>max. 1 A (for MH, MC, MHC)</td>
</tr>
<tr>
<td>Door contact</td>
<td>24 VAC</td>
<td>NYM-O</td>
<td>2 × 1.0 mm²</td>
<td>max. 1 A (for TH, TC)</td>
</tr>
</tbody>
</table>

Table I6: Cable list for on-site connections – TopTronic® C
### Table I7: Cable list for on-site connections – EasyTronic EC

<table>
<thead>
<tr>
<th>Component</th>
<th>Designation</th>
<th>Voltage</th>
<th>Cable</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EasyTronic EC Controller</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td></td>
<td>1 × 230 VAC</td>
<td>NYM</td>
<td></td>
</tr>
<tr>
<td>External room temperature sensor</td>
<td></td>
<td></td>
<td>2 × 2 × 0.8 mm</td>
<td>shielded, max. 30 m length</td>
</tr>
<tr>
<td>TopVent® control signals</td>
<td></td>
<td></td>
<td>J-Y(St)Y</td>
<td></td>
</tr>
<tr>
<td>Door contact</td>
<td></td>
<td>24 V DC</td>
<td>NYM</td>
<td></td>
</tr>
<tr>
<td>Pump/valve control</td>
<td></td>
<td>230 V AC</td>
<td>depending on the number of contacts</td>
<td>via field-supplied relay, max 2 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 V DC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TopVent® Terminal box design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td></td>
<td>3 × 400 V AC</td>
<td>NYM-J</td>
<td>min. 7 m length</td>
</tr>
<tr>
<td>TopVent® control signals</td>
<td></td>
<td></td>
<td>J-Y(St)Y</td>
<td>Fan, air distribution</td>
</tr>
</tbody>
</table>

### Actuator Air-Injector

<table>
<thead>
<tr>
<th>Component</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control voltage</td>
<td>0…10 V DC</td>
</tr>
<tr>
<td>Operating range</td>
<td>2…10 V DC</td>
</tr>
<tr>
<td>Position response</td>
<td>2…10 V DC</td>
</tr>
</tbody>
</table>

### Fan

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable signal</td>
<td>digital</td>
</tr>
<tr>
<td>Control voltage</td>
<td>0…10 V DC</td>
</tr>
</tbody>
</table>

Table I8: Control signals for TopVent® in terminal box design
System design

1. Design example ................................................................. 102
2. Maintenance schedule .................................................... 104
3. Checklist for project discussions ..................................... 105
1 Design example

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

### Design data
- Geometry of the room: 50 × 60 × 12 m²
- Internal heat gains: 28 kW
- People in the room: 20 people
- Heating and cooling with central energy supply (boiler and water chiller)
- Improvement of air quality, fresh air supply for the people in the room (fresh air flow rate per person = 30 m³/h)

### Design conditions heating:
- Fabric heat losses: 350 kW
- Fresh air temperature: -15 °C
- Room temperature: 18 °C
- Extract air temperature: 20 °C
- Temperature of the heating medium: 60 °C / 40 °C

### Design conditions cooling:
- Transmission sensible gains: 140 kW
- Fresh air conditions: 32 °C / 40 % RH
- Room air conditions: 26 °C / 40 % RH
- Extract air temperature: 28 °C
- Temperature of the cooling medium: 6 °C / 12 °C

### Fresh air supply
- Required fresh air flow rate in total: 20 × 30 = 600 m³/h
- Fresh air ratio of supply air units: max. 10 % of the nominal air flow rate
  
  The fresh air ratio can be adjusted from 0…100 %. Where EU Regulation 1253/2014 applies, it must be restricted to max. 10 % in the design conditions.

- Calculate the required number of supply air units from the nominal air flow rate.
- Size 6: max. 600 m³/h fresh air
- Size 9: max. 900 m³/h fresh air

  → 1 TopVent® MC unit

### Mounting height
- Calculate the actual mounting height (= distance between the floor and the bottom edge of the units).
  \[ Y = \text{ Hall height} - \text{distance from ceiling} - \text{unit height} \]
- Compare the actual mounting height with the minimum and maximum mounting height (see Table I1 on page 92 and HK-Select).
Required performance for covering fabric heat losses/transmission sensible gains

- Required heat output for coverage of fabric heat losses in total:
  \[ Q_{H\text{req}} = \text{Fabric heat losses} - \text{internal heat loads} \]
  \[ 350 - 28 = 322 \text{ kW} \]

- Required cooling capacity for coverage of transmission sensible gains in total:
  \[ Q_{C\text{req}} = \text{Transmission sensible gains} + \text{internal heat loads} \]
  \[ 140 + 28 = 168 \text{ kW} \]

Required heat output of recirculation units

- Determine the required heat output of the recirculation units based on the capacity of the supply air unit.
  \[ Q_{H\text{Recirculation}} = Q_{H\text{req}} - Q_{H\text{Supply air}} \]

For the supply air unit, take into account only the share of capacity that is used for coverage of fabric heat losses (separately shown in HK-Select).

Required cooling capacity of recirculation units

- Determine the required cooling capacity of the recirculation units based on the capacity of the supply air unit.
  \[ Q_{C\text{Recirculation}} = Q_{C\text{req}} - Q_{C\text{Supply air}} \]

For the supply air unit, take into account only the share of capacity that is used for coverage of transmission sensible gains (separately shown in HK-Select).

Minimum number of recirculation units

- Determine the minimum number of recirculation units depending on the available supply air units. Take into account the following criteria:
  - Floor area covered
  - Heat output
  - Cooling capacity
  - Unit clearances

<table>
<thead>
<tr>
<th>Supply air unit</th>
<th>Recirculation units</th>
<th>Required number of recirculation units</th>
<th>Minimum number of recirculation units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Type</td>
<td>Floor area covered</td>
<td>Heat output</td>
</tr>
<tr>
<td>1 unit MC-6/C</td>
<td>TC-6/C</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>TC-9/C</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>TC-9/D</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>1 unit MC-9/C</td>
<td>TC-6/C</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>TC-9/C</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>TC-9/D</td>
<td>3</td>
<td>4</td>
</tr>
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<td>1 unit MC-9/D</td>
<td>TC-6/C</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>TC-9/C</td>
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<td>4</td>
</tr>
<tr>
<td></td>
<td>TC-9/D</td>
<td>3</td>
<td>(3 \text{-}2 \text{ kW})</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Activity</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renew air filter</td>
<td>When the filter alarm is displayed, at least annually</td>
</tr>
<tr>
<td>Comprehensively checking function; cleaning and possibly repairing the TopVent® units</td>
<td>Annually by Hoval customer service</td>
</tr>
</tbody>
</table>

Table J1: Maintenance schedule
## Checklist for project discussions

<table>
<thead>
<tr>
<th>Project</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address</th>
<th>Tel.</th>
<th>Fax</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Information about the hall

<table>
<thead>
<tr>
<th>Application</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insulation</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Questions

- Is the roof strong enough? [ ] yes [ ] no
- Are there window areas? [ ] yes [ ] no
- Is there a crane? [ ] yes [ ] no
- Is there enough space for installation and servicing? [ ] yes [ ] no
- Are there any voluminous installations or machines? [ ] yes [ ] no
- Are pollutants present? [ ] yes [ ] no
  - Percentage? [ ]
  - Height? [ ]
  - Which? [ ]
- Is oil contained in the extract air? [ ] yes [ ] no
- Is dust present? [ ] yes [ ] no
  - Dust level? [ ]
  - How much? [ ]
- Is there high humidity? [ ] yes [ ] no
- Are local machine extractions required? [ ] yes [ ] no
  - Which? [ ]
- Are any conditions imposed by public authorities? [ ] yes [ ] no
  - Which? [ ]
- Are sound level requirements to be fulfilled? [ ] yes [ ] no
  - Which? [ ]
**System design**

**Design data**
- Internal heat gains (machines, ...): kW
- Heating and cooling:
  - Unit size
  - Control zones

**Design conditions heating**
- Standard outside temperature: °C
- Room temperature: °C
- Extract air temperature: °C
- Fabric heat losses: kW

**Design conditions cooling**
- Standard outside temperature: °C
- Room temperature and humidity: °C %
- Extract air temperature: °C
- Transmission sensible gains: kW

**Further information**
Hoval quality.
You can count on us.

As a specialist in heating and air-conditioning technology, Hoval is your experienced partner for system solutions. For example, you can heat water with the sun's energy and the rooms with oil, gas, wood or a heat pump. Hoval ties together the various technologies and also integrates room ventilation into this system. You can be sure to save both energy and costs while protecting the environment.

Hoval is one of the leading international companies for indoor climate solutions. More than 70 years of experience continuously motivates us to design innovative system solutions. We export complete systems for heating, cooling and ventilation to more than 50 countries.

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

Responsibility for energy and environment