Halton Rex for Vario
R6O - Variable air volume chilled beam

Halton Rex for Vario chilled beam is:

- Combined cooling, heating, and supply air unit for flush installation within a suspended ceiling
- Well suited for demand based ventilation with constant static pressure ductwork
- Ideal solution for applications where high-quality indoor conditions, energy efficient operation and individual room control are appreciated

Typical applications: office rooms, landscape offices and meeting rooms.

Halton Rex for Vario chilled beam is designed for high quality office requirements with high flexibility of the airflow adjustability. The Halton Rex for Vario operation will adapt to changes in the use of the space and office layout changes.

- Adjustable supply air flow rate changes with Operation Mode Damper (OMD).
- Individually adjustable velocity conditions with Halton Velocity Control (HVC).
- In-built flexibility for partition wall relocations with Halton Velocity Control
- Demand based ventilation for efficient use of energy in constant-pressure ductwork zone applications.
- Enhanced life cycle performance with optimised air and water flow rates

Product models & accessories

- Model with combined cooling and heating coil
- Model with room controllers
Dimensions and weight

<table>
<thead>
<tr>
<th>ØD</th>
<th>160</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil length</td>
<td>1000, +100, ..., 3400</td>
</tr>
<tr>
<td>L-5</td>
<td>1195, +100, ..., 3595 (+1715)</td>
</tr>
<tr>
<td>kg/m</td>
<td>15</td>
</tr>
</tbody>
</table>

Integration with suspended ceiling
Material

<table>
<thead>
<tr>
<th>Part</th>
<th>Material</th>
<th>Finishing</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front panel</td>
<td>Pre-painted galvanised steel</td>
<td>Polyester-painted white (RAL 9010 / 20% gloss)</td>
<td>Special colours available Polyester-epoxy-painted</td>
</tr>
<tr>
<td>Side plates</td>
<td>Pre-painted galvanised steel</td>
<td>Polyester-painted white (RAL 9010 / 20% gloss)</td>
<td>Special colours available Polyester-epoxy-painted</td>
</tr>
<tr>
<td>End plates</td>
<td>Galvanised steel</td>
<td>Polyester-epoxy-painted white (RAL 9010 / 20% gloss)</td>
<td>Special colours available Polyester-epoxy-painted</td>
</tr>
<tr>
<td>Supply air plenum</td>
<td>Galvanised steel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brackets</td>
<td>Galvanised steel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coil pipes</td>
<td>Copper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coil fins</td>
<td>Aluminium</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Accessories and product options

<table>
<thead>
<tr>
<th>Accessory / model</th>
<th>Code</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combinated cooling and heating coil</td>
<td>TC = H</td>
<td>Coil with hot water circulation</td>
<td>Cooling/heating copper water pipe - connections are Ø 15/10 mm See Product Code tab</td>
</tr>
<tr>
<td>Room controller</td>
<td>RC =</td>
<td>Room controller for LonWorks, BACnet or Modbus</td>
<td>See Product Code tab</td>
</tr>
<tr>
<td>Sensors</td>
<td>SA =</td>
<td>Sensors for occupancy and/or CO2</td>
<td>See Product Code tab</td>
</tr>
<tr>
<td>Control panel</td>
<td>CP =</td>
<td>Control panel for LonWorks, BACnet or Modbus</td>
<td>See Product Code tab</td>
</tr>
<tr>
<td>Water valves and actuators</td>
<td>CV =</td>
<td>Danfoss AB-QM dn 10 (heating)</td>
<td>See Product Code tab</td>
</tr>
</tbody>
</table>

Cooling/heating water pipe connections are Cu15/Cu10 with wall thickness of 0.9-1.0 mm fulfilling European Standard EN 1057:1996.
The maximum chilled/hot water circuit operating pressure is 1.0 MPa.
The supply air duct connection is 125 mm.
Function

The Halton Rex for Vario chilled beam is designed to be installed flush with a suspended ceiling.

The primary supply air enters the plenum of the active chilled beam. From there the air is diffused into the room through nozzles controlled by Operation Mode Damper (OMD).

The supply air nozzle jets efficiently induce ambient room air, which is directed horizontally along the ceiling surface. Secondary air is drawn through the perforation located at the bottom of the beam. The air then cycled through the heat exchanger, where it is either cooled or heated before being diffused into the room.
Velocity control in the occupied zone

Halton Velocity Control (HVC) is used for adjusting room air velocity conditions either when room layout is changed (e.g., in cases where the partition wall is located near the chilled beam) or when local, individual velocity conditions need to be altered. HVC adjustment has an impact on the induced room air flow through the heat exchanger, and therefore it either increases or decreases both the velocities in the occupied zone and the cooling/heating capacity of the chilled beam.

The HVC damper is divided into sections (Pos.1-3) to enable the adjustment of conditions in different parts of the occupied zone.

It is recommended to design the chilled beam in the normal position in order to allow both throttle and boost functions during the building's life cycle.

Operation mode control

The supply air flow of the chilled beam nozzle jets are dependent on effective heat exchanger length and static chamber pressure.

Halton Operation Mode Damper (OMD) is used for adjusting and controlling the outdoor air flow rate in a room space. The airflow rate is dependent on the opening position of the control damper. Operation mode of the room space is monitored with occupancy sensor. In unoccupied mode (1.) the supply air flow rate is set to minimum value that is able to remove material emission. In occupied mode (2.) supply airflow rate is set to normal office mode. When more persons are coming to the space, based on CO2-sensor air flow is increased to boost mode (3.) to maintain the set target value of indoor air quality.

It is recommended that chilled beams for demand based airflows should be connected to constant pressure ductwork zone.
Temperature controls

The cooling and heating capacities of the chilled beam are controlled by regulating the water flow rate according to the control signal of the room temperature controller.

In heating mode, it is recommended that the temperature difference between the jet outlet and room air would not be greater than 3 °C. The inlet water temperature of the heat exchanger should not be higher than 35 °C. Optimal heating performance requires an appropriate primary air flow rate. Thus, the air handling unit shall operate during heating periods to ensure proper heating performance.

Controls

The Halton Rex Vario controller is a room controller dedicated to complete room applications providing the control of cooling, heating, demand controlled ventilation.

- Rex Vario integrated room controller
- Room air temperature measurement to control space temperature
- Occupancy sensor for demand based operation with Operation Mode Damper (OMD)
- Air quality control with carbon dioxide sensor, CO₂
- Cooling with chilled water control valve
- Heating with hot water control valve as an option
- Several user interface options, either wall mounted or hand-held remote controller
- Condense prevention

The Halton Rex Vario room controller manages the chilled beam operation by controlling chilled water and hot water control valves in 2- or 4-pipe applications.

The Halton Rex Vario room controller provides a wide variety of connections for sensors and actuators and the possibility to connect a wall mounted panel with or without a display for local set points adjustment e.g. temperature, and a wireless remote control.
Installation

The Halton Rex for Vario active chilled beam is especially suitable for ceiling mounting running parallel to exterior wall of the room. When selecting of the chilled beam orientation, the location of the supply air and water circuit connections are taken into account.

The chilled beam can be attached directly to the ceiling surface (H1 = 230 mm) or suspended using threaded drop rods (8 mm). Depending on the length of the unit the fixing points are located as show at the drawings.

Install the main pipelines of the cooling and heating water circuits above the level of the chilled beam in order to enable venting of the pipework.

Bracketing, total length from 1200 to 1500 mm

Bracketing, total length from 1600 to 2200 mm

Bracketing, total length from 2300 to 3600 mm
Adjustment

Cooling

The recommended cooling water mass flow rate is 0.02-0.10 kg/s, resulting in a temperature rise of 1-4 °C in the heat exchanger. To avoid condensation, the recommended inlet water temperature of the heat exchanger is 14-16 °C.

Heating

The recommended heating water mass flow rate is 0.01-0.04 kg/s, resulting in a temperature drop of 5-15 °C in the heat exchanger. The maximum temperature of the inlet water for the heat exchanger is 35 °C.

Balancing and control of water flow rates

Balance the water flow rates of the Halton Rex for Vario chilled beam with adjustment valves installed on the outlet side of the cooling and heating water loops. The cooling capacity and heating capacity of the chilled beam are controlled by regulating the water mass flow rate. The water mass flow rate can be controlled by using an ON/OFF valve or a two- or three-way proportional valve.

Adjustment of supply air flow rate

Connect a manometer in the measurement tap and measure the static pressure in the Halton Rex for Vario chilled beam. The air flow rate is calculated according to the formula below.

Total air flow rate ($qv$)

$$qv = qv_1 + qv_2$$

$qv$  Total air flow rate, l/s or m³/h
$qv_1$  Normal mode nozzle jet air flow rate, l/s or m³/h
$qv_2$  Boost mode nozzle jet airflow rate, l/s or m³/h

Nozzle jet air flow rate ($qv_1$ and $qv_2$)

$$qv_{1,2} = k \cdot l_{\text{eff}} \cdot \sqrt{\Delta P_m}$$

$l_{\text{eff}}$  Length of the coil [m]
$\Delta P_m$  Measured static chamber pressure [Pa]

<table>
<thead>
<tr>
<th>Nozzle</th>
<th>$k$ (l/s)</th>
<th>$k$ (m³/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.70</td>
<td>2.52</td>
</tr>
<tr>
<td>B</td>
<td>1.06</td>
<td>3.82</td>
</tr>
<tr>
<td>C</td>
<td>1.35</td>
<td>4.86</td>
</tr>
<tr>
<td>D</td>
<td>2.03</td>
<td>7.31</td>
</tr>
<tr>
<td>E</td>
<td>3.31</td>
<td>11.92</td>
</tr>
</tbody>
</table>

Same $k$ factors will be used to all the operation modes. Please note the $l_{\text{eff}}$ may differ between the normal and boost modes.
Servicing

Code description:
1. Front panel
2. Side plate
3. Operation mode damper (OMD)
4. Supply air connection
5. Heat exchanger

Open the front panel of the supply air plenum, the ductwork, and the heat exchanger. In beams longer than 2400 mm, the front panel can be opened in two sections.

Clean the supply air plenum and finned coils of the heat exchanger with a vacuum cleaner, taking care not to damage the finned coils.

Clean the front panel and, if required, the side plates, using a damp cloth.
Technical specification

The active chilled beam shall have an integral recirculation air path through the perforated front panel. The induced room air flow rate shall be manually adjustable via three setting positions without influencing the primary air supply flow rate. The airflow rate of the chilled beam shall be adjustable without plugging or changing the nozzles.

The primary air flow rate shall be adjustable in meeting rooms from minimum to maximum (0-100%) when static chamber pressure is kept constant. The chilled beam unit equipped with a motorized operation mode damper. The beam with adjustable air flow rate shall have only one duct connection.

The front panel shall be openable from either side in order to allow general maintenance and cleaning. The front panel shall be removable without any special tools. The air supply to the room space shall be bi-directional. The active chilled beam shall be 595 mm wide and 230 mm high.

The active chilled beam shall have an inlet duct diameter of 160 mm. The frame, front, and side panels shall be made of galvanised steel plate. All visible parts shall be white, painted to RAL 9010, 20% gloss. All pipes shall be manufactured from copper, and connection pipes with a wall thickness of 0.9-1.0 mm. The fins shall be manufactured from aluminium. All joints shall be soldered and factory pressure-tested. The pipework's maximum operation pressure is 1.0 MPa.

The active chilled beam shall have measurement taps to allow air flow measurements to all the operation modes. Active chilled beams shall be protected by a removable plastic coating.

The duct connection and pipe ends shall remain sealed during transport. The active chilled beams shall be identified by labels attached to both the active chilled beam and the plastic packaging.
Product code

R6O-S-L-P-D

S = Nozzle type (1st row)
   A  Bi-directional/ Nozzle 1
   B  Bi-directional/ Nozzle 2
   C  Bi-directional/ Nozzle 3
   D  Bi-directional/ Nozzle 4
   E  Bi-directional/ Nozzle 5

L = Total length
   1200,+100,..,3600 (and 1720)

P = Nozzle type (2nd row)
   A  Bi-directional/ Nozzle 1
   B  Bi-directional/ Nozzle 2
   C  Bi-directional/ Nozzle 3
   D  Bi-directional/ Nozzle 4
   E  Bi-directional/ Nozzle 5

D = Nozzle length (2nd row)
   1000,+100,..,3400

Other options and accessories

E = Duct connection / Duct size / Damper
   R3N  Right / 160 / Without damper
   L3N  Left / 160 / Without damper

TC = Cooling / Heating functions (coil type)
   C  Cooling
   H  Cooling and Heating

RC = Room controller
   LA1  LonWorks: HVL-527 for single unit
   LA2  LonWorks: HVL-527 for up-to 6 units
   LA3  LonWorks: Without room controller
   BA1  BACnet: HVB-527 for a single unit
   BA2  BACnet: HVB-527 for up-to 6 units
   BA3  BACnet: Without room controller
   MA1  Modbus: HVM-283T for a single unit
   MA2  Modbus: HVM-283T for up-to 6 units
   MA3  Modbus: Without room controller

All room controller models, except LA3, BA3 and MA3, include unit integrated with:
- temperature sensor
- dew point detector

SE = Sensors
   NA  Not assigned
   SA1  Occupancy sensors
        (with BA-and LA-serie room controllers)
   SA2  Occupancy and CO₂ sensors
        (with BA-and LA-serie room controllers)
   SA3  CO₂ sensor
        (with BA-and LA-serie room controllers)
   SB1  Occupancy sensors
        (with MA-serie room controllers)
   SB2  Occupancy and CO₂ sensors
        (with MA-serie room controllers)
   SB3  CO₂ sensor
        (with MA-serie room controllers)

ED = Exhaust air diffuser control
   N  No
   Y  Yes

CP = Control panel
   NA  Not assigned
   PA2  With setpoint shift and display
        (BACnet and LonWorks only)
   PA3  Remote control unit
        (BACnet and LonWorks only)
   PB1  With setpoint shift
        (Modbus only)
   PB2  With setpoint shift and display
        (Modbus only)

CV = Water valves and actuators
   A3  Max flow limit, Danfoss AB-QM dn 10
       (heating) and dn15 (cooling) actuator
       0-10V, factory assembled
   A4  Max flow limit, Danfoss AB-QM dn 10
       (heating) and dn15 (cooling) actuator
       0-10V, delivered separately

CO = Colour
   W  White
   X  Special colour

ZT = Tailored product
   N  No

Code example

R6O-B-3000-C-2600; LD=R3N, TC=C, RC=LA1, SE=SA1, ED=Y, CP=PA1, CV=A3, CO=W, ZT=N, AC=SB1, LM2