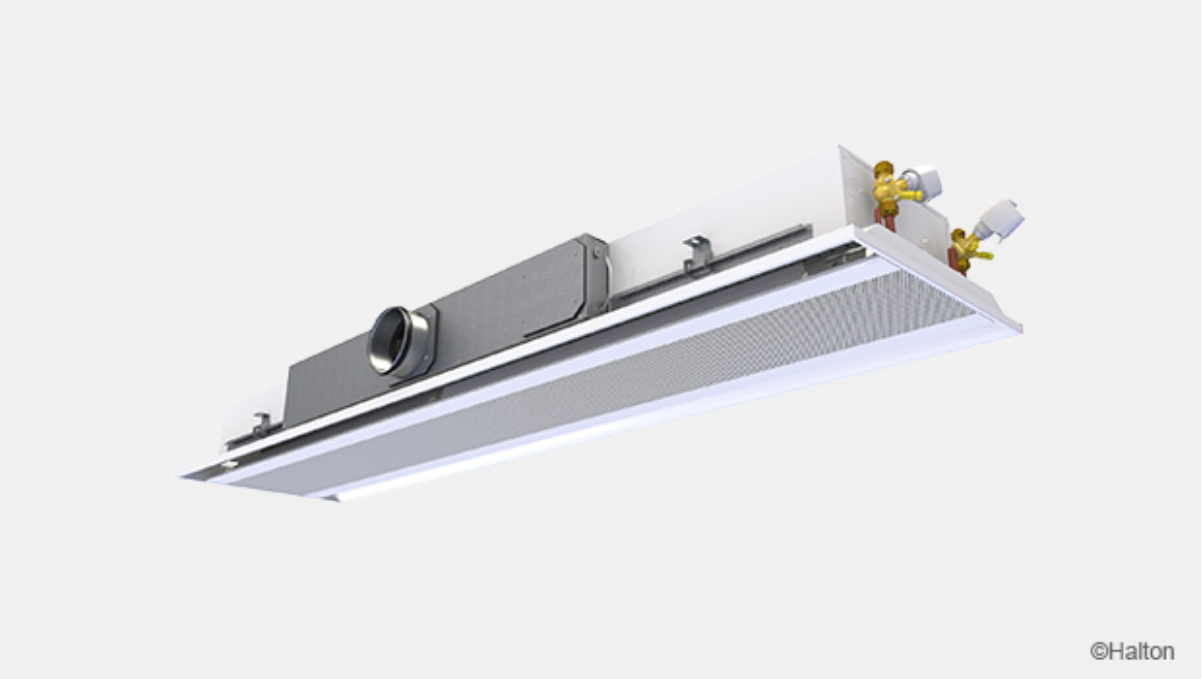
Halton Rex Integrated VAV (R6O) – Chilled beam



Overview

Halton Rex Integrated VAV chilled beam is:

- Suitable for demand based Halton Workplace control systems.
- Combined cooling, heating, and supply air unit for flush installation within a suspended ceiling
- Well suited for demand based ventilation with constant staticpressure 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 Integrated VAV chilled beam is designed for high quality office requirements with high flexibility of the airflow adjustability. The Halton Rex Integrated VAV operation will adapt to changes in the use of the space and office layout changes.

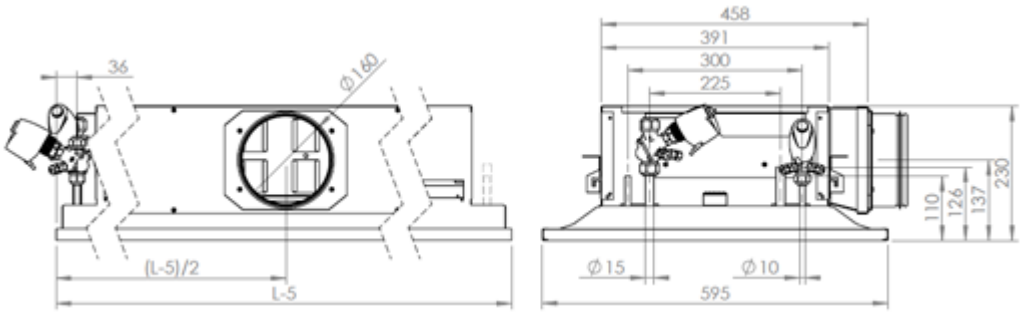
- Adjustable supply air flow rate changes with Operation Mode Damper (OMD).
- Individually adjustable velocity conditions with Halton Velocity Control (HVC).
- In-built flexibility for partition wall relocations with Halton Velocity Control.
- Demand based ventilation for efficient use of energy in constant-pressure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

Product models and Accessories

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

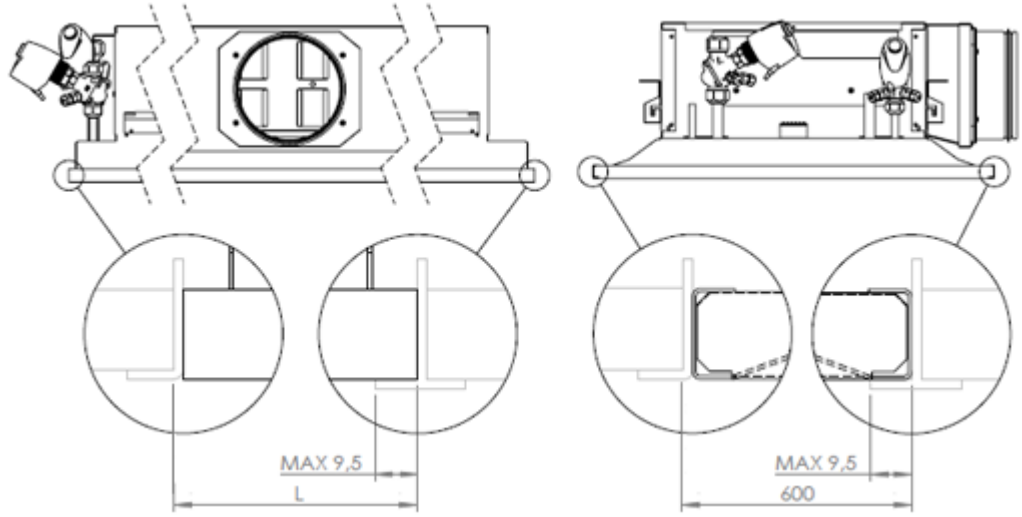
Halton chilled beams are certified by Eurovent Certita.

Dimensions



Ø D	160
Coil length (mm)	1000, +100, ..., 3400
L-5 (mm)	1195, +100, ..., 3595 (+1715)
kg/m	15

Integration with suspended ceiling



Material

Part	Material	Finishing	Note
Front panel	Pre-painted galvanised steel	Polyester-painted, white (RAL 9003 or RAL 9010, 20% gloss)	Special colours available Polyester-epoxy-painted
Side plates	Pre-painted galvanised steel	Polyester-painted, white (RAL 9003 or RAL 9010, 20% gloss)	Special colours available Polyester-epoxy-painted
End plates	Galvanised steel	Polyester-painted, white (RAL 9003 or RAL 9010, 20% gloss)	Special colours available
Supply air plenum	Galvanised steel		
Brackets	Galvanised steel		
Coil pipes	Copper		
Coil fins	Aluminium		

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.

Accessories

Accessory/mode	Code	Description	Note
Combined cooling and heating coil	TC = H	Coil with hot water circulation	Cooling/heating copper water pipe connections are Ø 15/10 mmSee Order Code
Room controller	RC =	Room controller for LonWorks or BACnet	See Order Code
Sensors	SE =	Sensors for LonWorks or BACnet	See Order Code
Control panel	AQ =	Control panel for LonWorks or BACnet	See Order Code
Water valves and actuators	CV =	Danfoss AB-QM dn10 (Heating)	See Order Code

Function

The Halton Rex Integrated VAV 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 exhanger, where it is either cooled or heated before being diffused into the room.

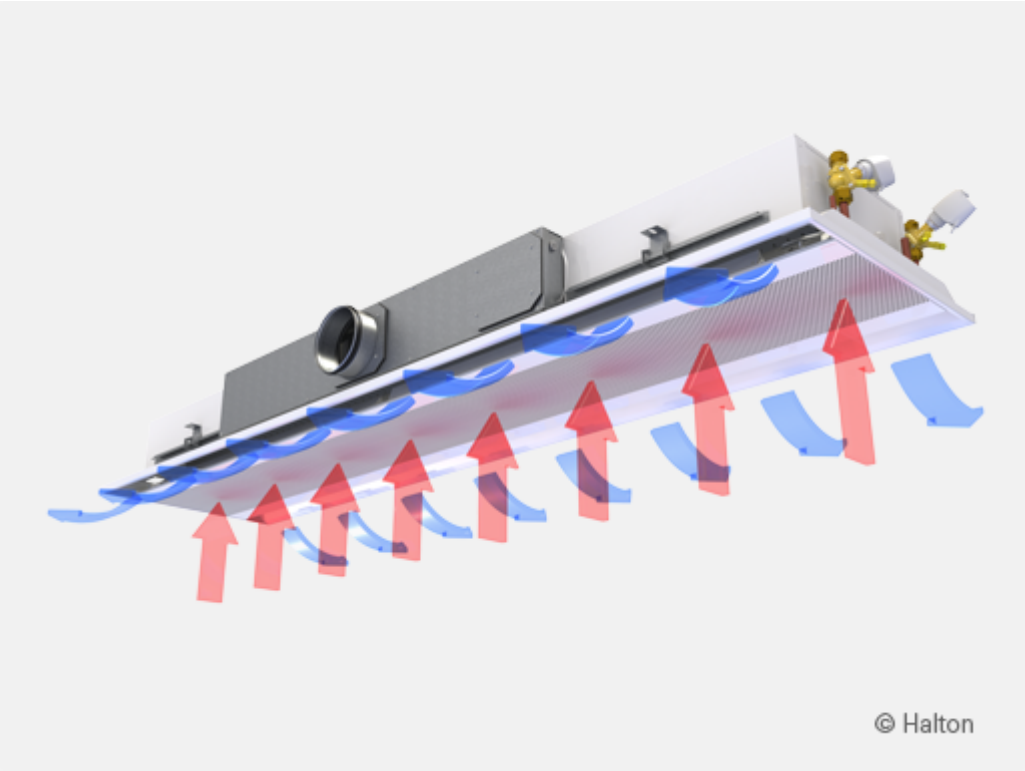


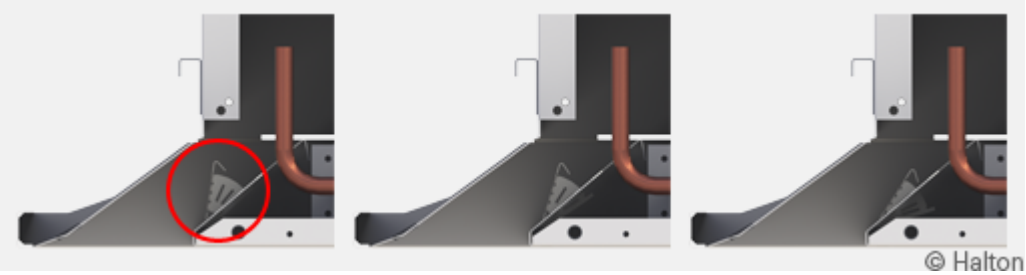
Fig.1. Function of the Halton Rex Integrated VAV beam

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 chilled beam is located near the partition wall) or when local, individual velocity conditions need to be altered. Halton velocity control adjustment has an impact on the induced room airflow 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.

Halton Velocity Control involves manual velocity adjustment with three different positions (Fig.2.): 1 = Throttle, 2 = Normal, and 3 = Boost. The Halton velocity control system is divided into sections to enable the adjustment of conditions in different parts of the occupied zone. Depending on the length of the beam, optimal HVC damper module lengths between 500 and 1400 mm are used.

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



Pos. 1 *= Throttle position* ***Pos. 2*** *= Normal position* ***Pos. 3*** *= Boost position*

Fig.2. Halton Velocity Control (HVC) positions

Operation mode control

The supply airflow of the chilled beam nozzle jets is dependent on the nozzle type, nozzle row length and static chamber pressure.

The Operation Mode Damper (OMD, green in Fig. 3.) is used for adjusting and controlling the fresh airflow 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.

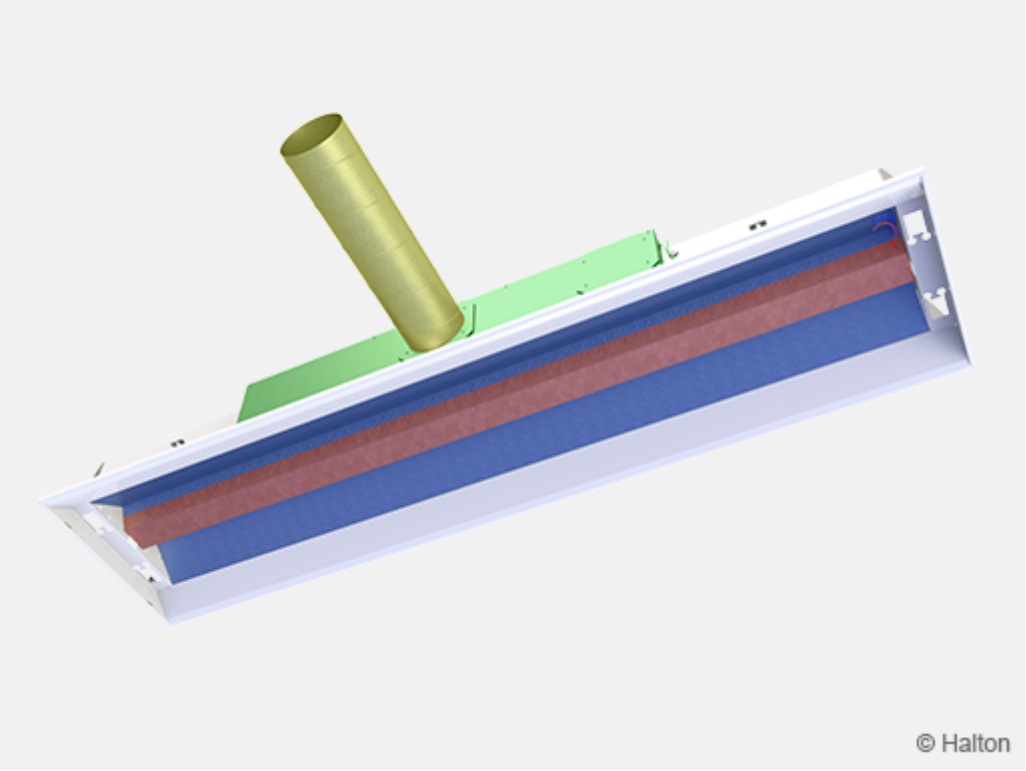
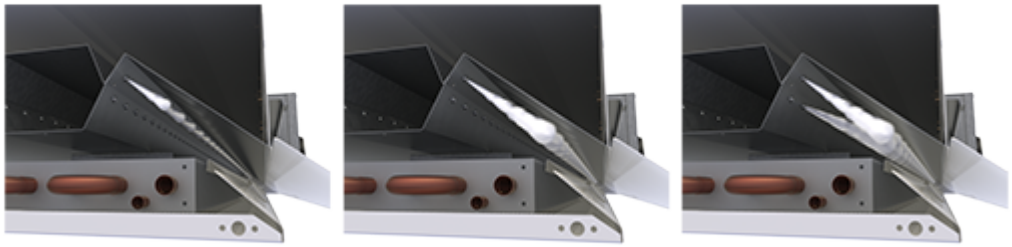


Fig.3. OMD (green), Chamber 1 (blue) , Chamber 2 (red)

Fig.4. below presents the function in different modes controlled by the OMD. In unoccupied mode (1.) the supply airflow rate is set to minimum value that can 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 CO_2-sensor airflow is increased to boost mode (3.) to maintain the set target value

of the indoor air quality.



1. Unoccupied mode **2.** Occupied mode **3.** Boost mode

Fig.4. Supply air modes of the Halton Rex Integrated VAV beam
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.

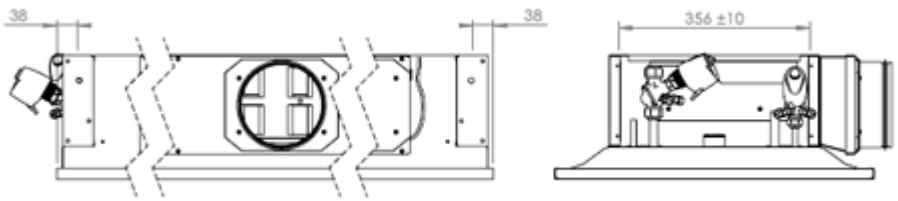
Installation

The Halton Rex Integrated VAV 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.

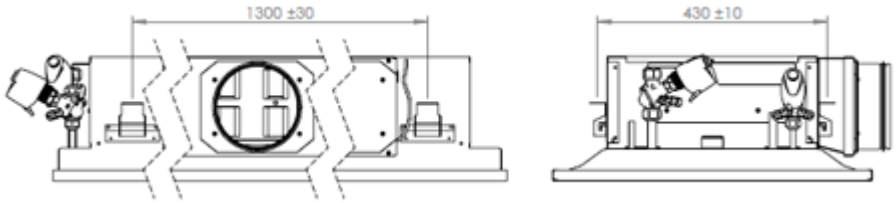
The chilled beam can be attached directly to the ceiling surface (H1 = 230 mm) or suspended using threaded drop rods (8 mm). Depending on the length of the unit the fixing points are located as show at the drawings.

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.

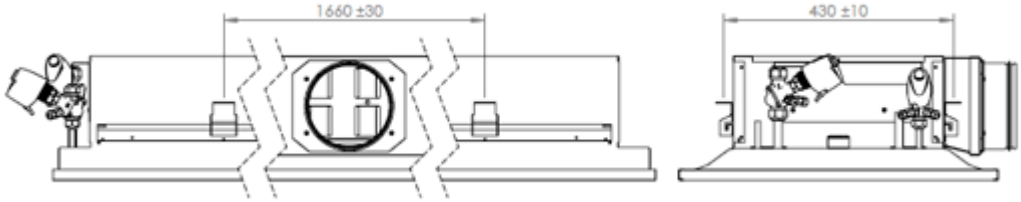
Bracketing, total length from 1200 or 1500 mm



Bracketing, total length from 1600 or 2200 mm



Bracketing, total length from 2300 – 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 airflow rate

Connect a manometer in the measurement tap and measure the static pressure in the Halton Rex Integrated VAV chilled beam. The measurement tab locations for OMD and chambers 1 and 2 are presented in Fig.1.

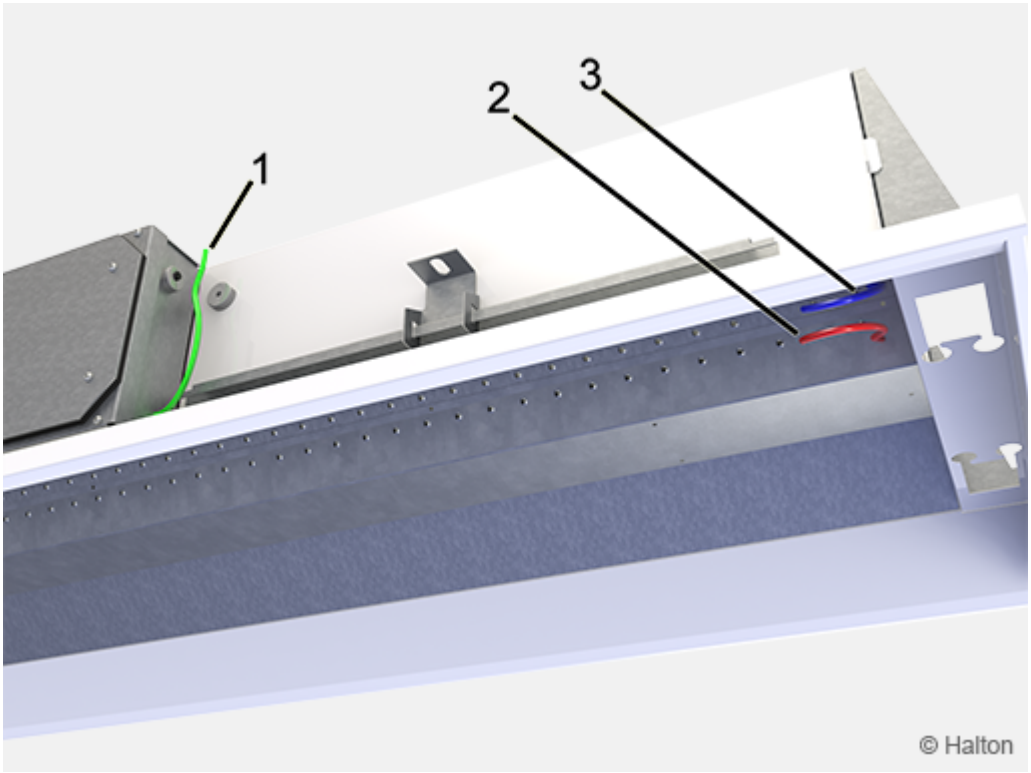


Fig.1. Location of measurement tabs

Key:
1. OMD (green)
2. Chamber 2 (red)
3. Chamber 1 (blue)

Total airflow rate (q_v)

$$q_v = q_{v1} + q_{v2}$$

q_v Total airflow rate, l/s or m^3/h

q_{v1} Chamber 1 nozzle jet airflow rate, l/s or m^3/h

q_{v2} Chamber 2 nozzle jet airflow rate, l/s or m^3/h

Nozzle jet airflow rate for Chamber 1 and 2 (q_{v1} and q_{v2})

$$q_{v1,2} = k * l_{eff} * \sqrt{\Delta p_m}$$

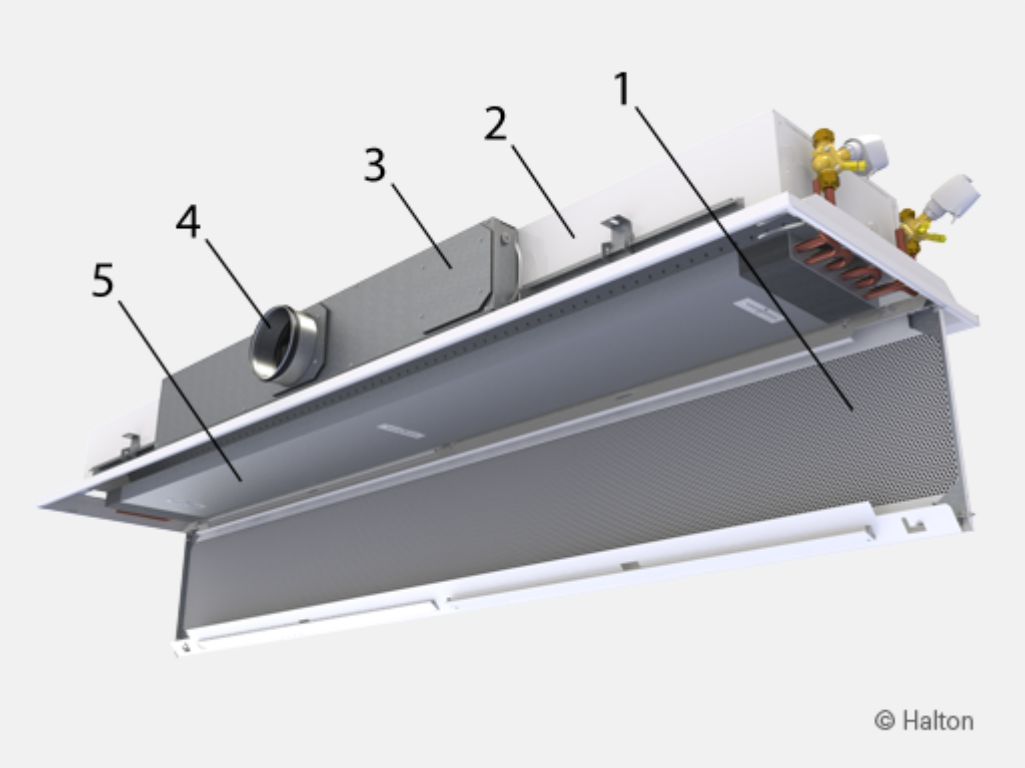
l_{eff} Length of the coil [m]

Δp_m Measured static chamber pressure [Pa]

	k (l/s)	k (m3/h)
A	0,70	2,52
B	1,06	3,82
C	1,35	4,86
D	2,03	7,31
E	3,31	11,92

Same k factors will be used to all the operation modes.
Please note the l_{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 echanger

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.

Specification

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

The primary airflow rate idadjustable in meeting rooms from minimum to maximum (0-100%) when static chamber pressure is kept constant.
The chilled beam unit is equipped with a motorised Operation Mode Damper (OMD).
The beam with adjustable airflow rate has only one duct connection.
The front panel is openable from either side in order to allow general maintenance and cleaning.
The front panel is removable without any special tools.
The air supply to the room space is bi-directional.

The active chilled beam is 595 mm wide and 230 mm high.
The active chilled beam has an inlet duct diameter of 160 mm.
The frame, front, and side panels are made of galvanised steel plate.
All visible parts are white, painted to RAL 9003 or RAL 9010 (20% gloss).

All pipes are manufactured from copper, and connection pipes with a wall thickness of 0.9-1.0 mm.
The fins are manufactured from aluminium.
All joints are soldered and factory pressure-tested.
The pipework s maximum operation pressure is 1.0 MPa.

The active chilled beam has measurement taps to allow air flow measurements to all the operation modes.
Active chilled beams are protected by a removable plastic coating.
The duct connection and pipe ends remain sealed during transport.
The active chilled beams can be identified by labels attached to both the active chilled beam and the plastic packaging.

Order code

R6O/S-L-P-D; LD-TC-RC-SE-ED-CP-CV-CO-ZT

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

LD = 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
NA Not assigned
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

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

SE = Sensors
NA Not assigned
SA Occupancy sensors (with BA- and LA-serie room controllers)
SA2 Occupancy and CO_2 sensors (with BA- and LA-serie room controllers)
SA3 CO_2 sensor (with BA- and LA-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)

CV = Water valves and actuators
NA Not assigned
A3 Max flow limit, Danfoss AB-QM dn 10 (heating) and dn15 (cooling) actuator 0-10V, factory assembled

CO = Colour
SW Signal white (RAL 9003)
W Pure white (RAL 9010)
X Special colour (RALxxxx)

ZT = Tailored product
N No
Y Yes (ETO)

Code example

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