Halton Rex RXP, chilled beam - Technical description

Contents

1 Introduction

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1.2 About this document

The purpose of this document is to give technical information and design examples for salespersons, technical support and designers.

1.3 Summary of changes

Release	Date	Description
5.0	5-Feb-2024	▪ RXP/Autonomic model added ▪ RXP/Flexible model updated
4.0	14-Jun-2023	▪ RXP/Flexible model added and earlier model named as RXP/Standard ▪ RXP/Flexible material added to all chapters
3.0	21-Apr-2022	▪ System package information added. ▪ Duct connection Ø160 mm: Only available if L=1200 and nozzle type=E. ▪ Editorial changes.
2.0	5-Nov-2021	▪ A new coil type added: cooling and heating. ▪ A new duct connection size added: Ø 160 mm.
1.0	15-Dec-2020	First version.

2 Product description

2.1 Overview

Compact, fully flexible constant air volume (CAV)/variable air volume (VAV) chilled beam with 4-way air distribution for suspended ceilings. Ensures silent and pleasant room conditions even with higher cooling capacities.

Application area

- Cooling, heating, and ventilation in offices, hospital rooms, schools, and public spaces.
- Can be used in CAV and demand-based VAV ventilation systems.

Key features

- Active chilled beam with 4-way air distribution.
- Three product models with adjustable airflow using manual CAV or motorised VAV actuators
  - Standard model with boost airflow control and pressure dependent operation
  - Flexible model with 0-100% airflow control and pressure dependent operation
  - Autonomic model with 0-100% airflow control and pressure independent operation
- Throw pattern expanded to corners, which ensures pleasant room conditions even with high cooling capacities.
- Model with Halton Workplace WRA, room automation system package.

2.2 Operating principle

The primary supply air enters the plenum of the Halton Rex RXP chilled beam, from which it is diffused into the room through the nozzles and supply slots. The air jets from the nozzles induce ambient room air efficiently through the heat exchanger, where the air is cooled or heated by means of the water circulating in the heat exchanger. The supply slots direct the air jets horizontally along the ceiling surface, which prevents the feeling of draught.

The blue arrows in *Fig. 1* show the supply air coming through the supply slots. The red arrows show the ambient room air going through the front panel and the heat exchanger.

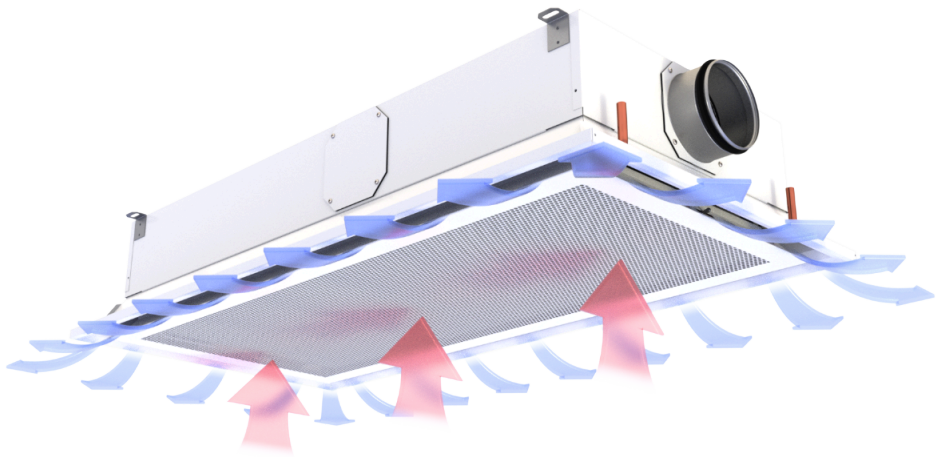

Fig. 1. Operating principle of the Halton Rex RXP chilled beam

Halton Air Quality (HAQ) control in Halton Rex RXP, Standard model

Halton Air Quality (HAQ) boost airflow control is used for adjusting or controlling the rate of the additional supply airflow in a room space. In normal conditions, fresh supply air is provided through the nozzles. Whenever additional air is needed (boost/VAV function), the HAQ control opens and provides more air. VAV stands for Variable Air Volume.

The HAQ control can also be used as a Constant Air Volume (CAV) damper, that is, it can be used for adjusting the k-factor to achieve the correct airflow with a certain pressure level. This removes the need for changing or plugging the nozzles of the Halton Rex RXP chilled beam.

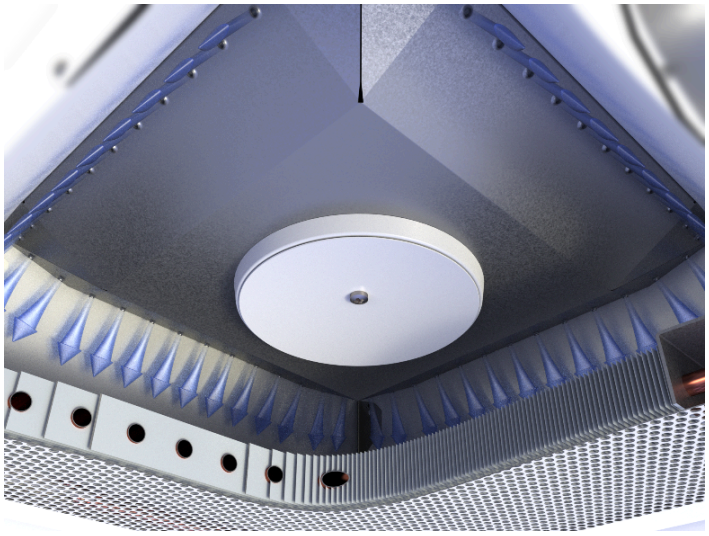

Fig. 2. VAV function: Supply air from nozzles (normal mode)

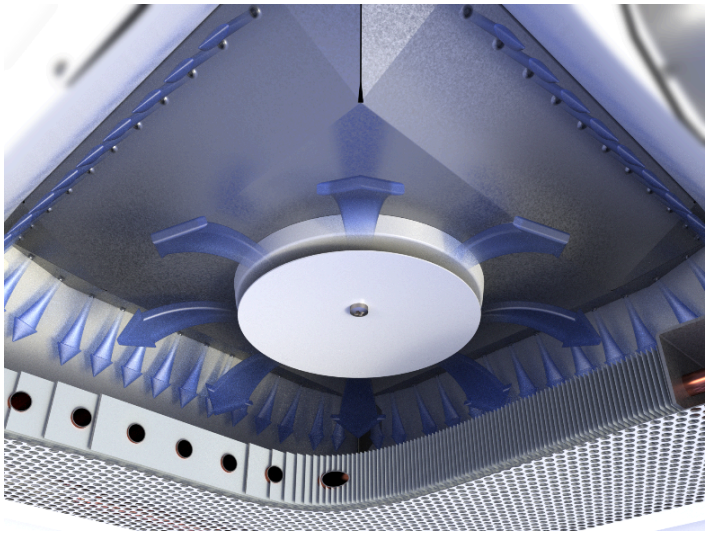

Fig. 3. VAV function with HAQ control: Supply air from nozzles and HAQ control (boost mode)

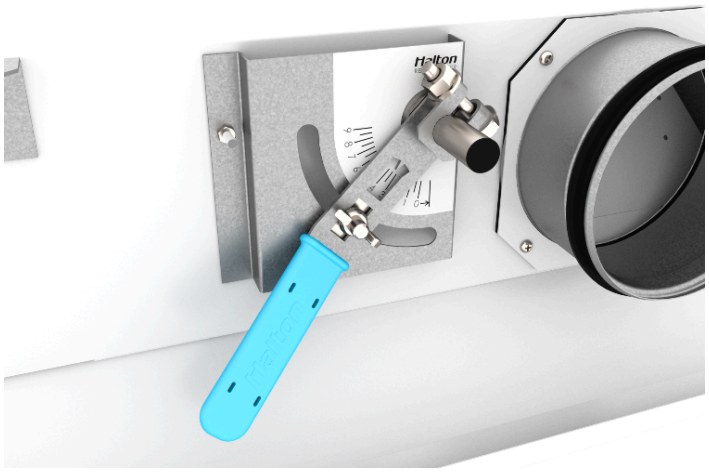

Fig. 4. Adjustment of the manual actuator of HAQ control in Halton Rex RXP, Standard model

Fig. 5. Electric actuator of HAQ control in Halton Rex RXP, Standard model

Halton Operation Mode Damper (OMD) in Halton Rex RXP, Flexible model

Halton Operation Mode Damper (OMD) fully flexible airflow control is used for manual supply airflow adjustment or for motorised Variable Air Volume (VAV) control of the supply airflow rate. The OMD control flexibly combines nozzle and HAQ airflow control providing full airflow flexibility with one nozzle configuration.

The OMD control can be used as a Constant Air Volume (CAV) damper, that is, it can be used for adjusting the k-factor to achieve the correct airflow with a certain pressure level. This removes the need for changing or plugging the nozzles of the Halton Rex RXP chilled beam.

When the OMD control is equipped with a motorised actuator, fully flexible VAV control is achieved. It allows different VAV modes with for instance minimum, normal and boost airflow settings.

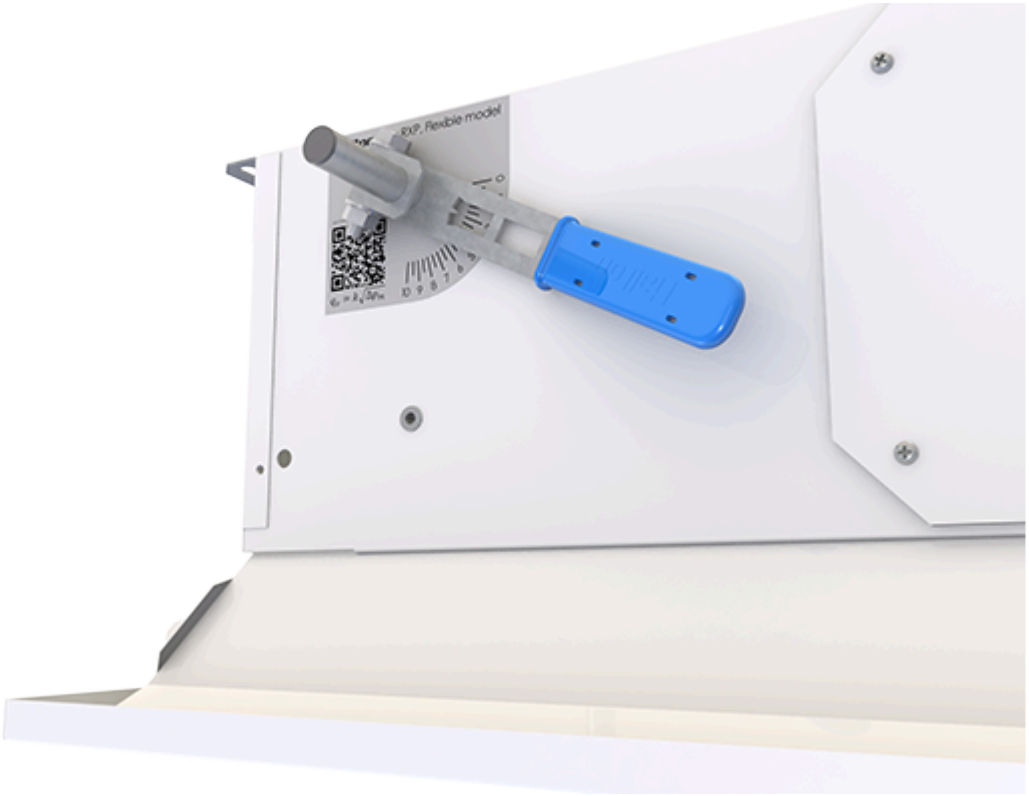

Fig. 6. Adjustment of the manual actuator of OMD control in Halton Rex RXP, Flexible model

Fig. 7. Electric actuator of OMD control in Halton Rex RXP, Flexible model

Halton Operation Mode Damper (OMD) in Halton Rex RXP, Autonomic model

Halton Operation Mode Damper (OMD) fully flexible airflow control is used for manual supply airflow adjustment or for motorised Variable Air Volume (VAV) control of the supply airflow rate. The OMD control flexibly combines nozzle and HAQ airflow control providing full airflow flexibility with one nozzle configuration.

In Halton Rex RXP, Autonomic model, when the OMD control is equipped with a motorised actuator integrated with pressure measurement, fully flexible VAV control with pressure independent operation is achieved. It allows different VAV modes with for instance minimum, normal and boost airflow settings.

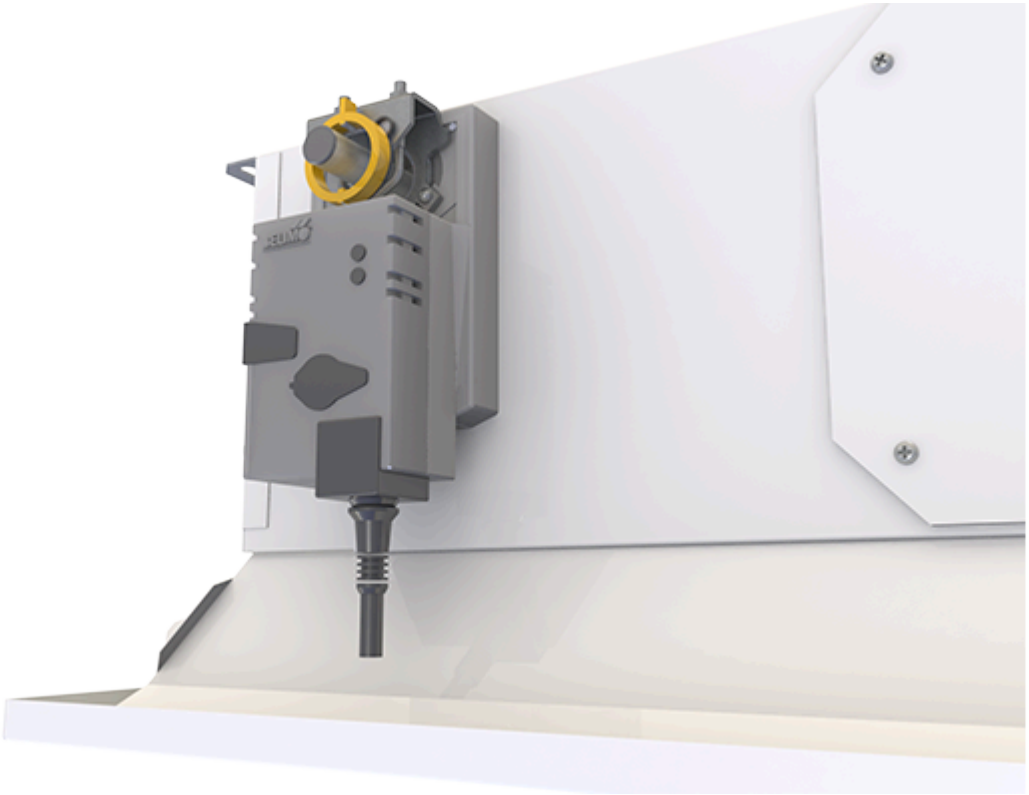

Fig. 8. Electric actuator integrated with pressure measurement of OMD control in Halton Rex RXP, Autonomic model

Velocity control in the occupied zone

Halton Rex RXP, Flexible and Autonomic models can be equipped with Halton Velocity Control (HVC). It 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.

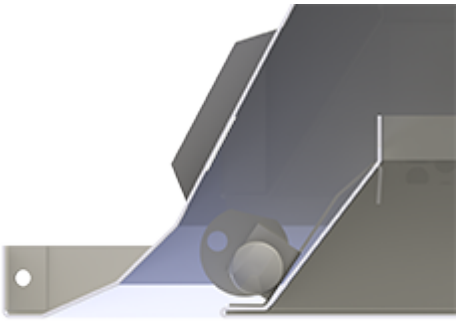

Fig. 9. HVC is in position Normal

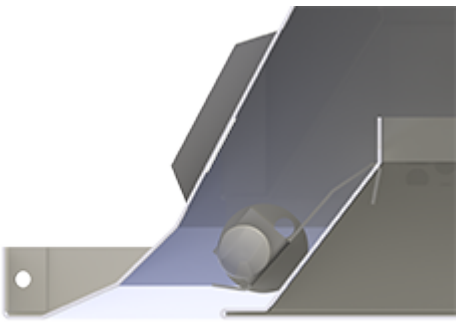

Fig. 10. HVC is in position Throttle

There are HVC controls in all four sides of Halton Rex RXP chilled beam. The HVC is divided into two parts in the long sides of RXP-1200 chilled beam. This enables the adjustment of conditions in different parts of the occupied zone.

2.3 Key technical data

Feature	Description
Airflow rate	Max. airflow rate 57 l/s or 205 m³/h (RXP/S-E-1200); 65 l/s or 234 m³/h (RXP/F-F-1200 and RXP/A-F-1200) < 35 dB
Dimensions	600x600 mm or 1200x600 mm
Water pressure drop	Max. 18.6 kPa (RXP-1200, waterflow 0.1 kg/s)
Cooling capacity	Up to 1700 W (RXP/S-E-1200, 100 Pa, 57 l/s, water inlet 14 °C, water mass flow 0.1 kg/s, supply air 16 °C)
Weight	10–22 kg (RXP/S) and 17-31 kg (RXP/F and RXP/A)
Typical total pressure drop	60–80 Pa
Typical water inlet temperature	▪ Cooling: 15–17 °C (must be above dew point) ▪ Heating: 30–50 °C

2.4 Features and options

Category	Feature (order code)	Option (order code)	Description
Product model	Model M	S	Standard product model with nozzle and HAQ airflow control options.
Size and orientation	Product length L	600, 1200	Two different lengths. Nominal width is always 600 mm.
	Duct connection E	S2, R2, L2	Ø125 mm. Factory-positioned straight, right, or left. Position can be changed on site. See the figure below.
		S3, R3, L3	Ø160 mm. Factory-positioned straight, right, or left. Position can be changed on site. See the figure below. **Note:** Only available if L=1200 and nozzle type=E.
Cooling / heating	Coil type TC	C	Cooling coil. Connection pipes: 2 x Ø12 mm.
		H	Cooling and heating coil. Connection pipes: 4 x Ø12 mm.
Airflow	Nozzle type S	C, D, E	3 options for different airflow or k-factor needs. Nozzle C is the smallest and nozzle E the largest.
	Control type CN	NA	No HAQ. The k-factor is determined by nominal size and nozzle selection (CAV).
		MA	Manually adjustable CAV control of additional airflow. Standard air from nozzles, additional air from HAQ.

Category	Feature (order code)	Option (order code)	Description
		M1	Motorised VAV control of additional airflow. Standard air from nozzles, additional air from HAQ.
Room air velocity level	Velocity control (HVC) VC	N	No HVC function.

Table 1. Halton Rex RXP, Standard model (RXP/S)

Category	Feature (order code)	Option (order code)	Description
Product model	Model M	F	Flexible product model with fully flexible OMD airflow control option
		A	Autonomic product model with fully flexible OMD airflow control options integrated with pressure measurement.
Size and orientation	Product length L	600, 1200	Two different lengths. Nominal width is always 600 mm.
	Duct connection E	S3, R3, L3	Ø160 mm. Factory-positioned straight, right, or left. Position can be changed on site. See the figure below. **Note:** Only available if L=1200 and nozzle type=E.
	Connection type (air and water) CT	S	Air and water connections at the same end.
		O	Water connections at the opposite end.
Cooling / heating	Coil type TC	C	Cooling coil. Connection pipes: 2 x Ø12 mm.
		H	Cooling and heating coil. Connection pipes: 4 x Ø12 mm.

Category	Feature (order code)	Option (order code)	Description
Airflow	Nozzle type S	F	No nozzle options, nozzle type is always F providing extensive airflow range with OMD airflow adjustment/ control.
	Control type CN	MA	Manually adjustable airflow (CAV) (available when M=F)
		M1	Motorised airflow control 0...10 VDC (VAV).
		M2	Motorised airflow control Modbus RTU/ BACnet MSTP (VAV).
Room air velocity level	Velocity control (HVC) VC	N	No HVC function.
		Y	Yes, HVC function included.

Table 2. Halton Rex RXP, Flexible model (RXP/F) and Autonomic model (RXP/A)

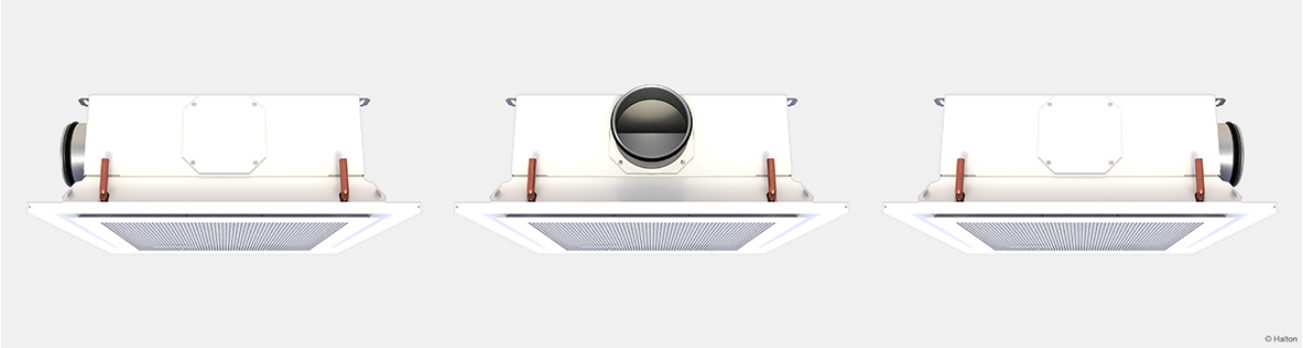

Fig. 11. Duct connection: Spigot positions left, straight, right

For more detailed information on the order code, see section ***Order code***.

2.5 Quick selection

Airflow

Halton Rex RXP, Standard model

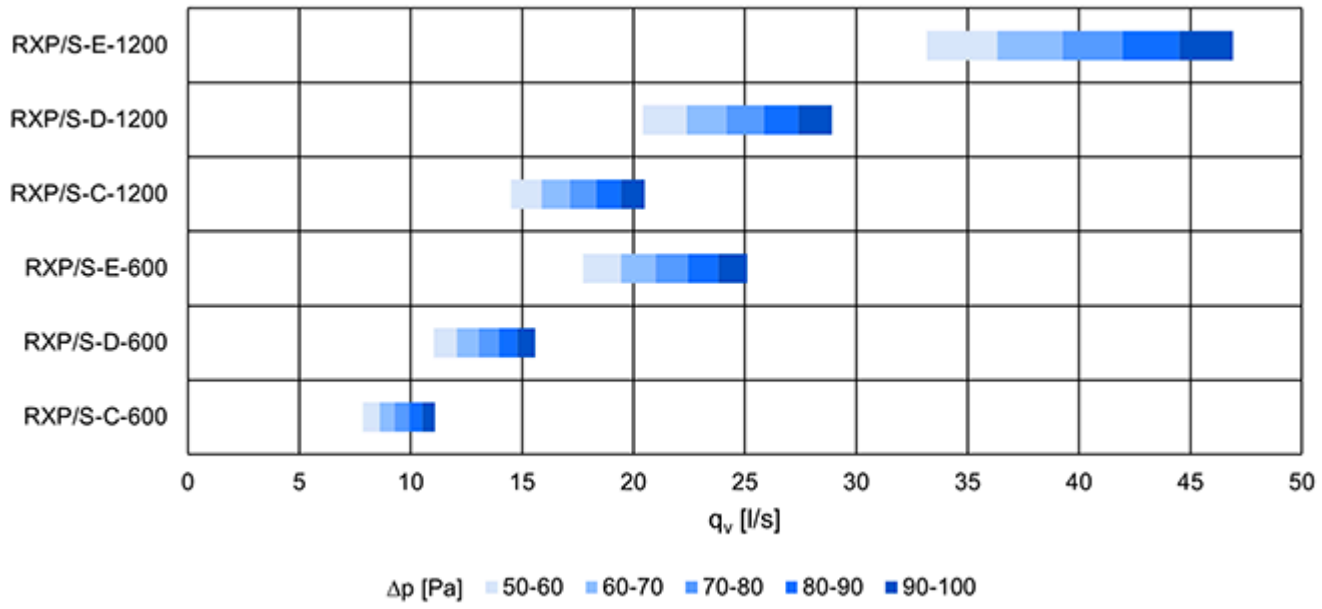

Fig. 12. Airflow ranges in l/s for Halton Rex RXP, Standard model without HAQ/with HAQ closed with different static chamber pressure levels

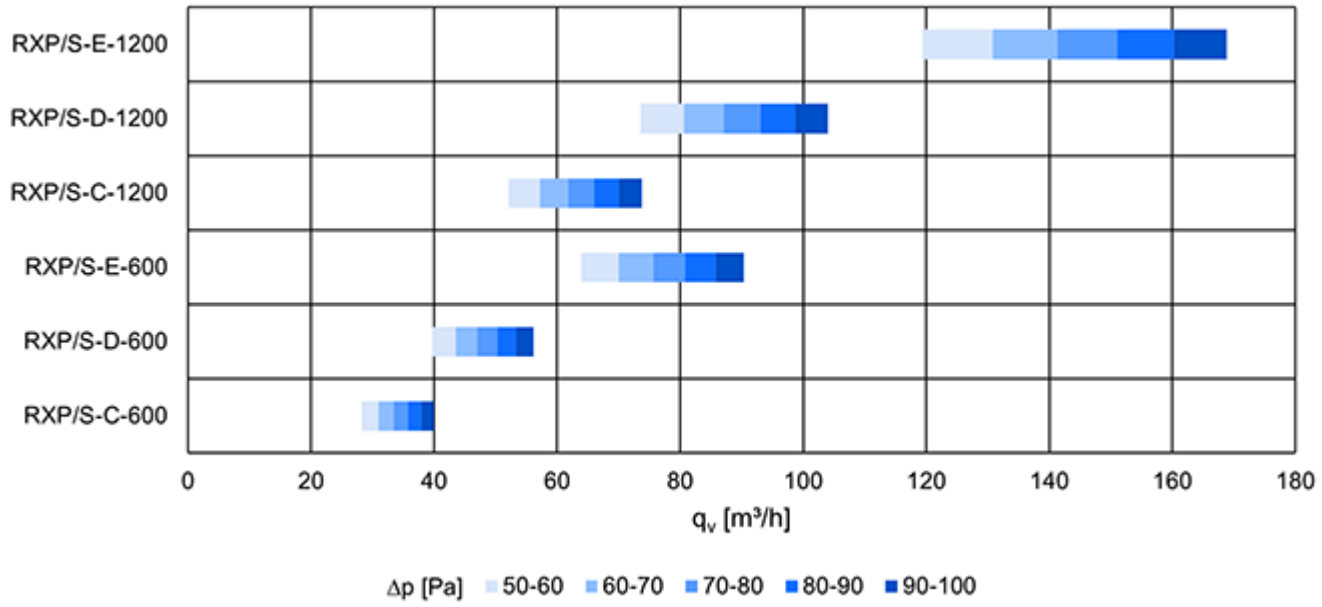

Fig. 13. Airflow ranges in m^3/h for Halton Rex RXP, Standard model without HAQ/with HAQ closed with different static chamber pressure levels

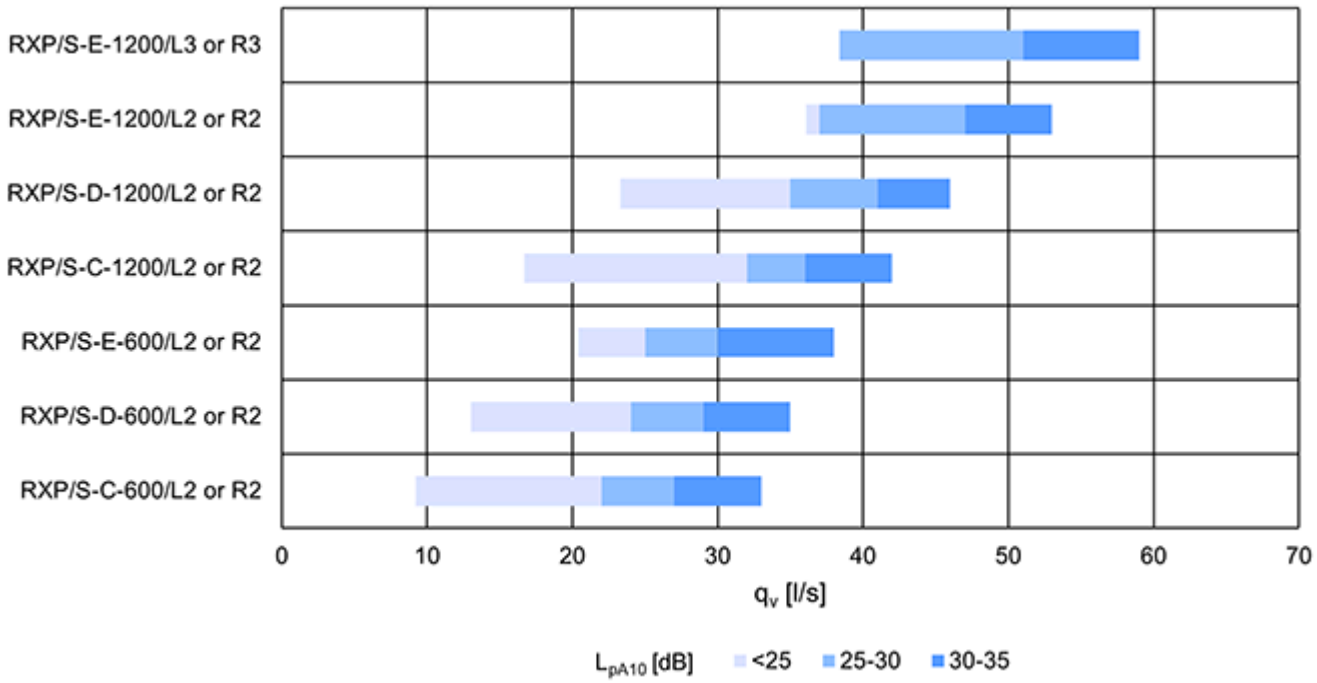

Fig. 14. Airflow ranges in l/s for Halton Rex RXP, Standard model with HAQ @70 Pa total pressure

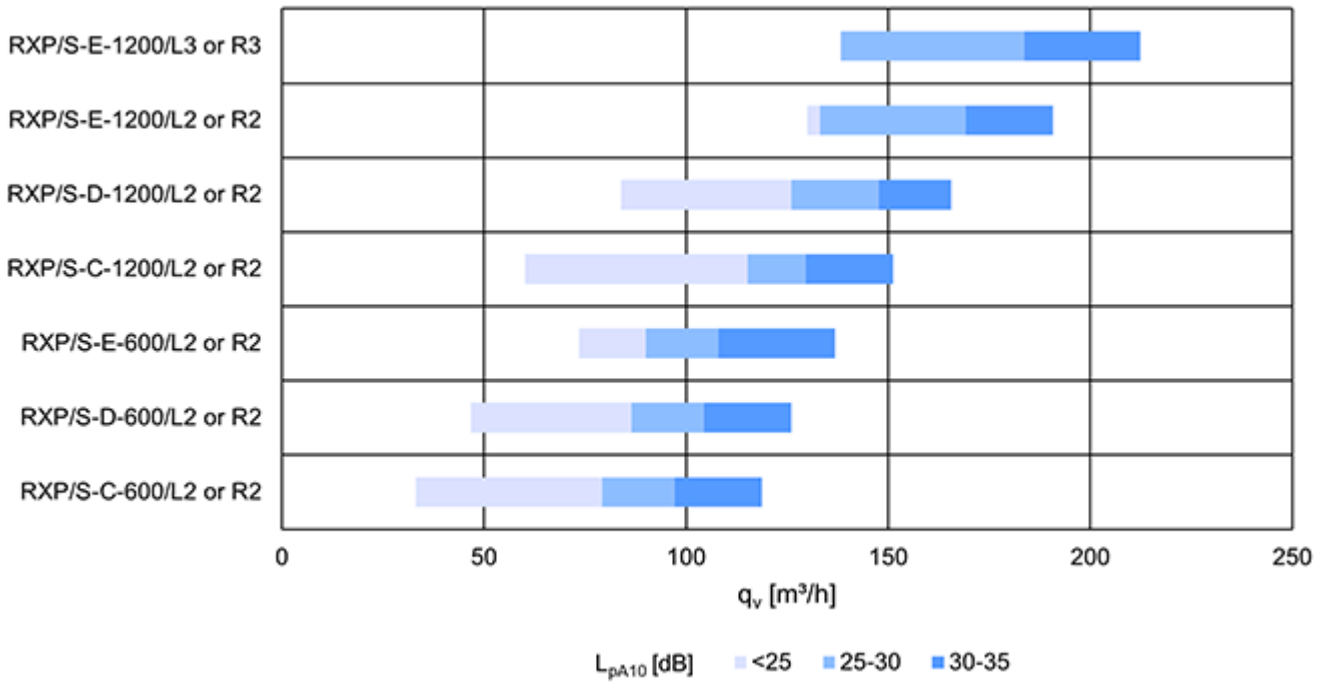

Fig. 15. Airflow ranges in m^3/h for Halton Rex RXP, Standard model with HAQ @70 Pa total pressure

Halton Rex RXP, Flexible and Autonomic models

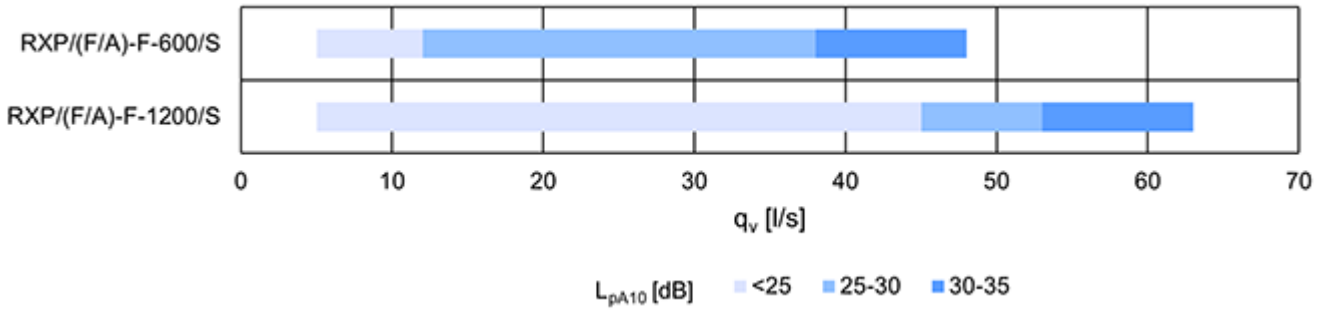

Fig. 16. Airflow ranges in l/s for Halton Rex RXP, Flexible and Autonomic models @70 Pa total pressure

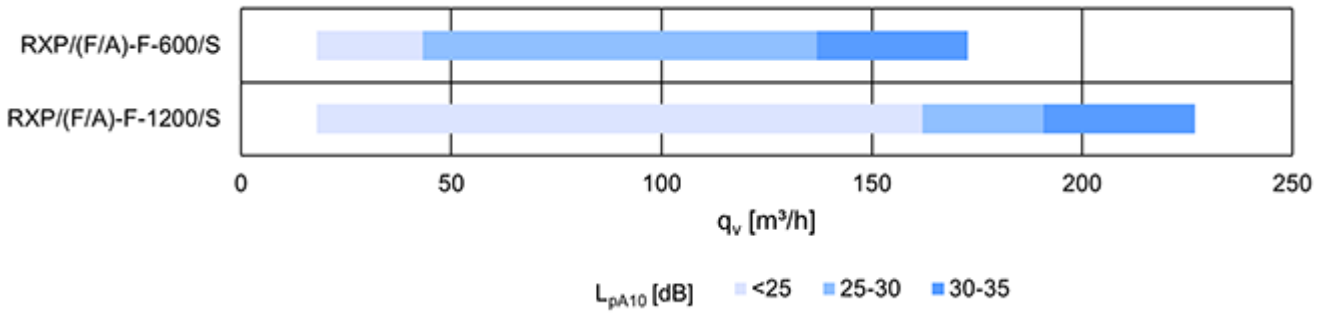

Fig. 17. Airflow ranges in m^3/h for Halton Rex RXP, Flexible and Autonomic models @70 Pa total pressure

Cooling capacity

Halton Rex RXP, Standard model

Product model with HAQ/OMD	Inlet/outlet water temp. [°C]	Room temp. [°C]	Total pressure [Pa]	Water mass flow [kg/s]	Airflow 30 dBA [l/s]	Capacity [W]		
						Water	Air (18°C)	Total
RXP/S-C-600	15/17	25	75	0.03	27	249	229	478
RXP/S-D-600				0.035	29	290	246	537
RXP/S-E-600				0.047	30	390	255	645
RXP/S-C-1200	15/18			0.038	36	483	306	789
RXP/S-D-1200				0.047	42	596	357	953
RXP/S-E-1200				0.055	48	687	408	1095

Halton Rex RXP, Flexible and Autonomic models

Product model with HAQ/OMD	Inlet/outlet water temp. [°C]	Room temp. [°C]	Total pressure [Pa]	Water mass flow [kg/s]	Airflow 30 dBA [l/s]	Capacity [W]		
						Water	Air (18°C)	Total
RXP/F-F-600 or RXP/A-F-600	15/17	25	75	0.049	36	412	306	718
RXP/F-F-1200 or RXP/A-F-1200	15/18			0.047	56	595	476	1071

2.6 Structure and materials

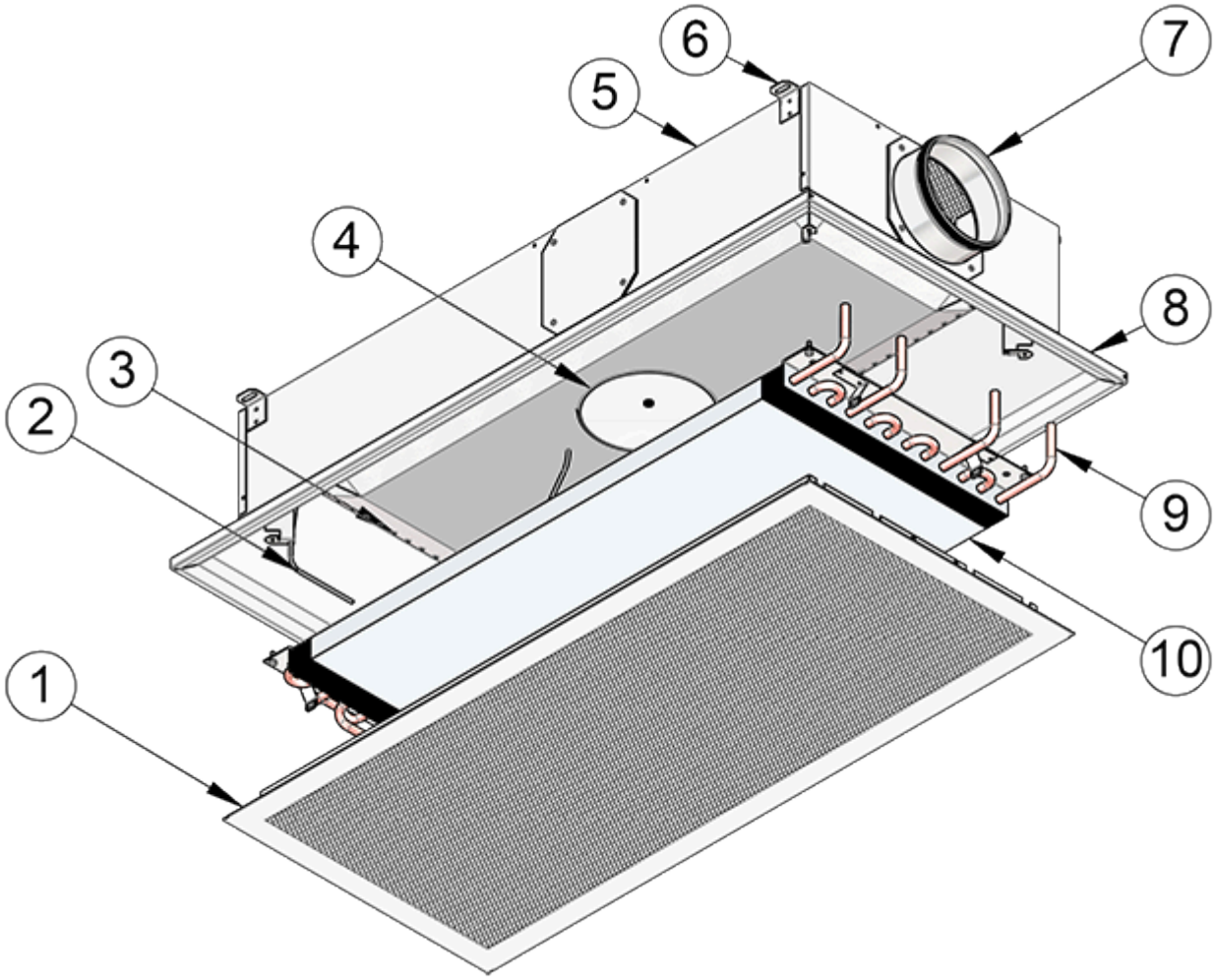

Fig. 18. Halton Rex RXP

No.	Part	Description	Note
1	Front panel	▪ Pre-painted galvanised steel ▪ Polyester-painted, white (RAL 9003)	Special colours available
2	Pressure measurement tube	Polyvinyl chloride	-
3	Nozzles	Galvanised steel	-
4	HAQ control	▪ Painted galvanised steel ▪ Optional part in Halton Rex RXP, Standard model (RXP/S) depending on HAQ selection and always included in Halton Rex RXP, Flexible (RXP/F) and Autonomic (RXP/A) models linked to the OMD control models	-
5	Plenum	▪ Pre-painted galvanised steel ▪ Polyester-painted, white (RAL 9003)	-
6	Brackets	Galvanised steel	-
7	Spigot	Galvanised steel	-
8	Frame	▪ Pre-painted galvanised steel ▪ Polyester-painted, white (RAL 9003)	Special colours available
9	Connection pipes	Copper. Ø12 mm with a wall thickness of 0.9–1.0 mm, fulfilling the requirements of European Standard EN 1057:1996.	-
10	Coil/Heat exchanger	▪ Pipes: copper ▪ Fins: aluminium	-

2.7 Dimensions and weight

The dimensions are given in millimetres [mm].

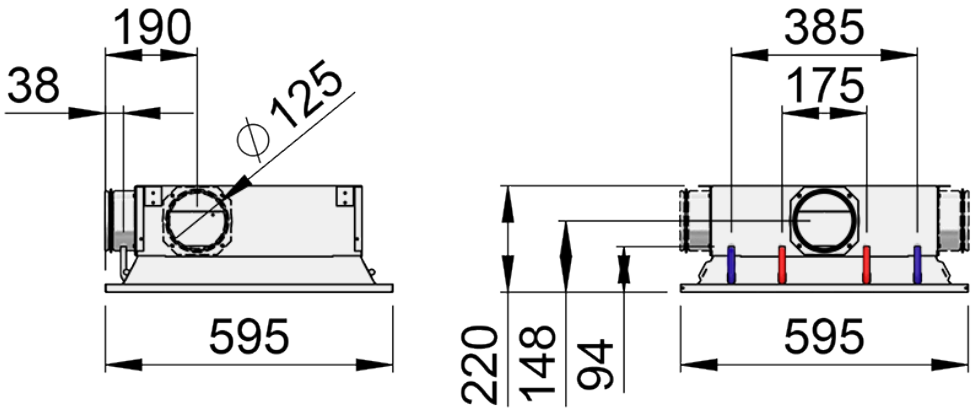

Fig. 19. Halton Rex RXP, Standard model dimensions (RXP/S-600)

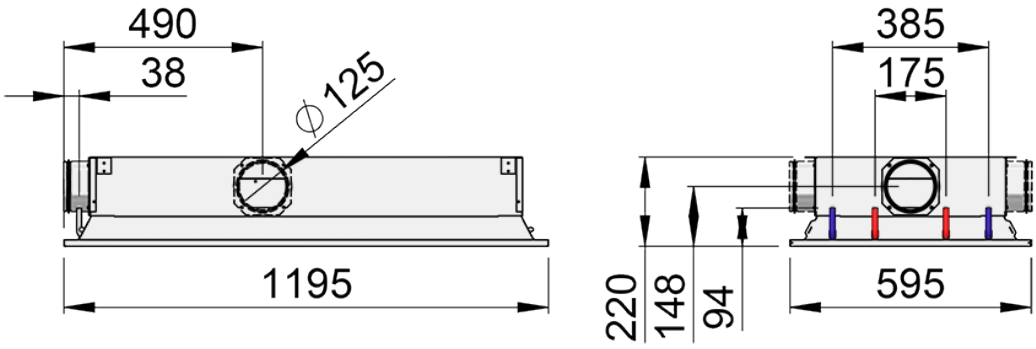

Fig. 20. Halton Rex RXP, Standard model dimensions (RXP/S-1200)

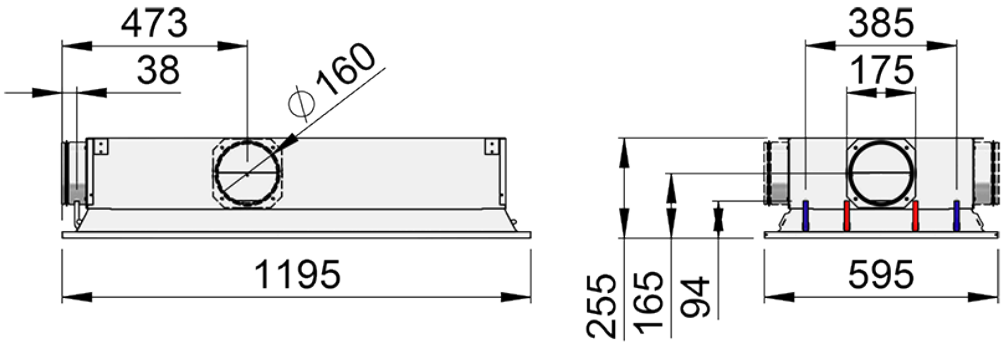

Fig. 21. Halton Rex RXP, Standard, Flexible and Autonomic models dimensions (RXP/S, RXP/F-1200 or RXP/A-1200)

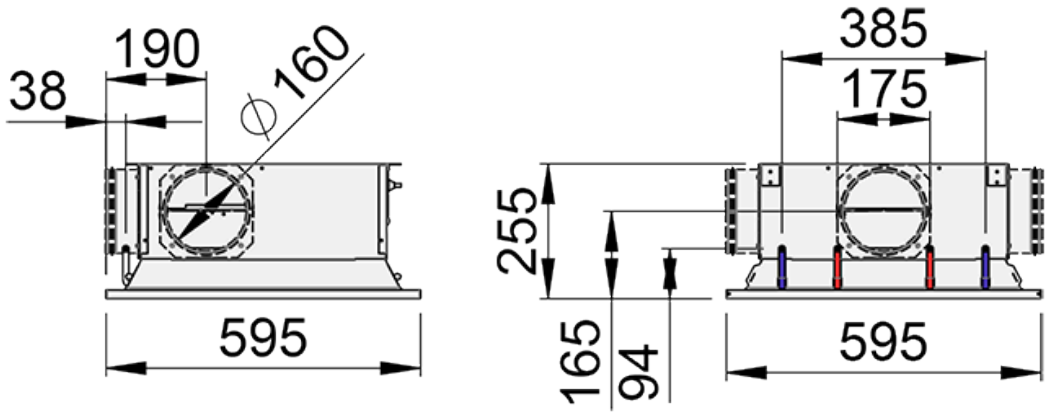

Fig. 22. Halton Rex RXP, Flexible and Autonomic models dimensions (RXP/F-600 or RXP/A-600)

Weight

Halton Rex RXP, Standard model

Product	CN model	Dry mass (excl. water) [kg]	Water volume [l]
RXP/S-*-600	NA	10.5	0.5
	MA	11.4	
	M1	11.6	
RXP/S-*-1200	NA	20.9	1.2
	MA	21.8	
	M1	22.1	

* Nozzle type, see section ***Order code***.

Halton Rex RXP, Flexible and Autonomic models

Product	CN model	Dry mass (excl. water) [kg]	Water volume [l]
RXP/F-F-600 or RXP/A-F- 600	MA	16.5	0.5
	M1 or M2	17.0	
RXP/F-F-1200 or RXP/A-F-1200	MA	30.4	1.2
	M1 or M2	31.0	

2.8 Specification

Active chilled beam with CAV/VAV airflow function and four-directional air distribution, used for cooling, heating, and ventilation in suspended ceilings, fulfilling the following requirements:

Function

- Three product models with adjustable airflow using manual CAV or motorised VAV actuators
  - Standard product model equipped with manual CAV or motorized (0...10 VDC) VAV actuators for boost airflow control and pressure dependent operation
  - Flexible product model equipped with manual CAV or motorised (0...10 VDC) VAV actuators for 0-100% airflow control and pressure dependent operation
  - Autonomic product model equipped with motorised (0...10 VDC or Modbus RTU/BACnet MSTP) VAV actuators for 0-100% airflow control and pressure independent operation
- Throw pattern expanded to corners automatically in higher airflow settings maintaining uniform supply air throw length.
- Flexible and Autonomic product models can be equipped with Halton Velocity Control (HVC) for adjusting room air velocity conditions individually on all four directions.

Structure

- Integral recirculation air path through the perforated front panel.
- Front panel removable to allow general maintenance and cleaning.
- Front panel removable without special tools.
- Four-directional air distribution.
- Unit width 595 mm, height 220 mm.
- Inlet duct diameter 125 mm or 160 mm.
- Duct connection position changeable without special tools.
- Measurement tap to allow airflow measurement.
- Pipework's maximum operating pressure 1.0 MPa.

Materials

- Plenum, frame, and front panel manufactured from galvanised steel.
- All visible parts white, painted in RAL 9003, 20% gloss.
- All pipes manufactured from copper.
- Water connection pipes have a wall thickness of 0.9–1.0 mm.
- All pipe joints soldered.
- All pipe joints pressure-tested at the factory.
- Heat exchanger fins manufactured from aluminium.

Packaging and identification

- The product is protected by a removable plastic coating.
- The duct connection and pipe ends remain sealed during transport.
- The product is identified by a serial number printed on labels attached both to the product and the cardboard box.

2.9 Order code

RXP/M-S-L-E, SP-TC-CT-CN-VC-CO-ZT

Main options for Halton Rex RXP	
M = Model	
S	Standard
F	Flex
A	Autonomic
S = Nozzle type	
C	Medium
D	Large
E	Extra large
F	Flex
L = Length [mm]	
600 or 1200	
E = Duct connection	
S2	Straight (Ø125)
R2	Right (Ø125)
L2	Left (Ø125)
S3	Straight (Ø160)
R3	Right (Ø160)
L3	Left (Ø160)

Other options and accessories	
SP = System package	
N	No
Y	Yes
TC = Cooling / Heating functions (Coil type)	
C	Cooling
H	Cooling and heating
CT = Cooling / Heating functions (Coil type)	
S	Air and water connections at the same end

Other options and accessories	
O	Water connections at the opposite end
CN = Control types	
NA	Not assigned
MA	Manual
M1	Motorised (0...10 VDC)
M2	Motorised (Modbus RTU/BACnet MSTP)
VC = Velocity control (HVC)	
N	No
Y	Yes
CO = Colour	
SW	Signal white (RAL 9003)
W	Pure white (RAL 9010)
X	Special colour
ZT = Tailored product	
N	No
Y	Yes (ETO)

Sub products for Halton Rex RXP	
System package	Halton Workplace WRA
Room exhaust	Halton Max MOC, VAV damper
Room exhaust	Halton Max MUC, VAV damper

Order code example

RXP/S-E-1200-S2, SP=N, TC=C, CT=S, CN=NA, VC=N, CO=SW, ZT=N

3 Design information

3.1 Design considerations

3.1.1 Installation

When planning the orientation of the Halton Rex RXP chilled beam, the location of the supply air and water circuit connections must be taken into account. The supply air spigot can be at either side of the unit or at the same end with the water connections. The location can be easily changed on site, if needed. There are product model options with Halton Rex RXP 600, Flexible and Autonomic models to have water connections at the same or opposite end than straight air connections.

The location of the actuator of the HAQ control (optional) must also be taken into account to ensure access to the airflow adjustment/actuator. The actuator is located in the middle of the left side of the unit in Halton Rex RXP chilled beam, Standard model. Similar way the location of the actuator of the OMD control (manual or motorised models) must also be taken into account to ensure access to the airflow adjustment/actuator. The actuator is located at the end of the left side of the unit in Halton Rex RXP chilled beam, Flexible and Autonomic models. See the figures below of the location and details in section ***Operating principle***.

The Halton Rex RXP chilled beam can be attached directly to the ceiling surface (H = 220 mm/225 mm Standard/Flexible model) or suspended using threaded drop rods (8 mm). The brackets for ceiling installation are located at the sides of the unit.

The Halton Rex RXP chilled beam can be integrated with a standard T-bar ceiling 600x600. The height of the edges of the unit is 16 mm. If other suspended ceiling integrations are needed, please contact Halton sales for further information.

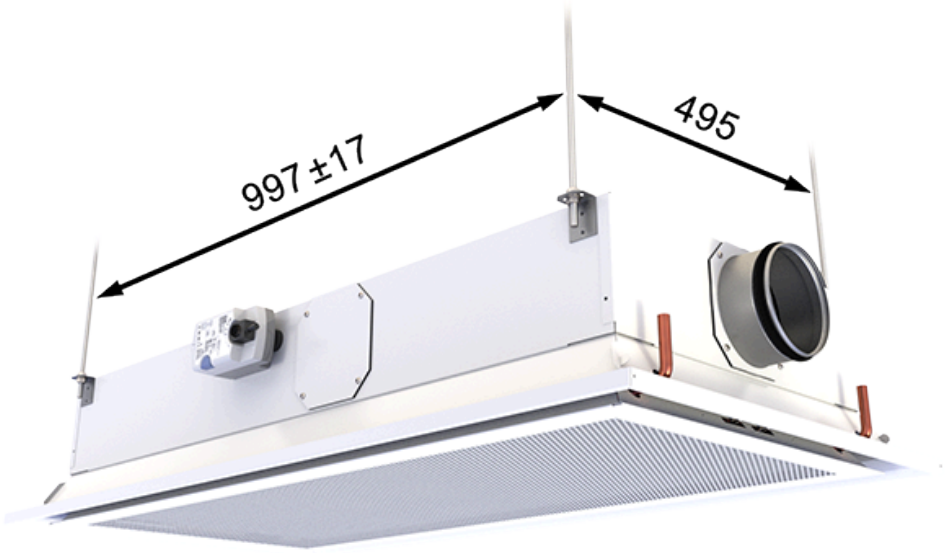

Fig. 23. Installation points of Halton Rex RXP 1200, Standard, Flexible and Autonomic models. The location of the actuator in Halton Rex RXP 1200, Standard model

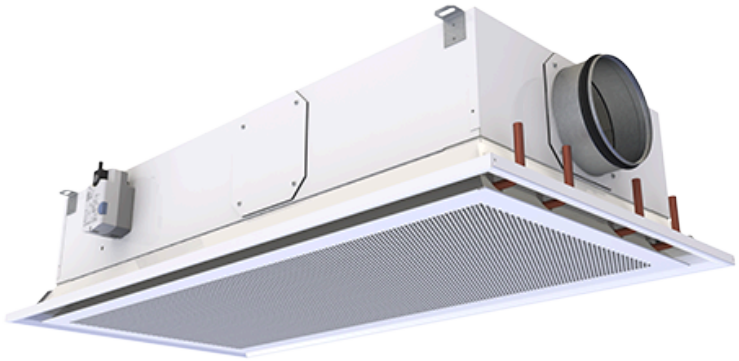

Fig. 24. The location of the actuator in Halton Rex RXP 1200, Flexible and Autonomic models

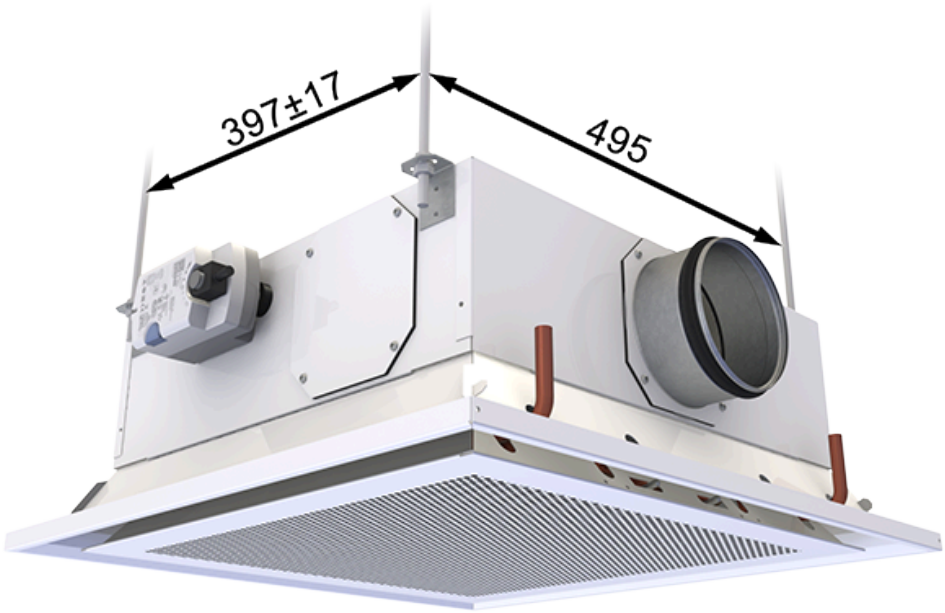

Fig. 25. Installation points and the location of the actuator of Halton Rex RXP 600, Standard model

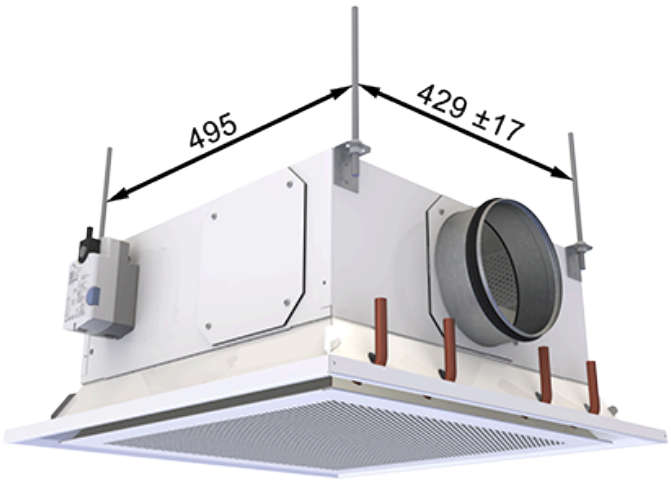

Fig. 26. Installation points and the location of the actuator of Halton Rex RXP 600, Flexible and Autonomic models

It is recommended that the main pipelines of the cooling and heating water circuits are installed above the level of the heat exchanger to enable venting of the pipework.

The maximum operating pressure for chilled/hot water pipework is 1.0 MPa.

3.1.2 Commissioning

Adjustment of the cooling capacity

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 minimum inlet water temperature of the heat exchanger is 14–16 °C.

Adjustment of the heating capacity

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 inlet water temperature of the heat exchanger is 35 °C.

Balancing and control of water flow rates

The water mass flow rates of the Halton Rex RXP chilled beam are balanced with adjustment valves installed on the outlet side of the water loops. The cooling or heating capacity of the Halton Rex RXP chilled beam is controlled by regulating the water mass flow rate.

Adjustment of the supply airflow rate

With a Halton Rex RXP chilled beam Standard model (RXP/S) that does not have the Halton Air Quality (HAQ) control, the airflow depends on the chamber pressure and the selected nozzle. With the HAQ control included, also the position of the HAQ control must be taken into account. The k-factors are given in the table below.

With a Halton Rex RXP chilled beam Flexible model (RXP/F) the position of the OMD control must be taken into account according to the table below.

The chamber pressure (RXP/S) or the OMD pressure (RXP/F) can be measured from a measurement tap under the front panel.

The total airflow rate is calculated using the formula below.

$$q_v = k\sqrt{\Delta p_m}$$

where

- q_v = Airflow rate in l/s or m^3/h.
- Δp_m = Measured pressure (Pa)
- k = The k-factor given as a function of mounting and diameter (see the tables below)

Halton Rex RXP, Standard model

Position of HAQ control	Control signal voltage [v]	k-factor [l/s], total airflow (Standard model)					
		600			1200		
		C*	D*	E*	C*	D*	E*
0 / closed/ no HAQ	0-1	1.11	1.56	2.51	2.05	2.89	4.69
0.5	1.5	1.39	1.84	2.79	2.33	3.17	4.97
1	2	1.67	2.12	3.07	2.61	3.45	5.25
1.5	2.5	1.94	2.39	3.34	2.88	3.72	5.52
2	3	2.21	2.66	3.61	3.15	3.99	5.79
2.5	3.5	2.47	2.92	3.87	3.41	4.25	6.05
3	4	2.72	3.17	4.12	3.66	4.50	6.30
3.5	4.5	2.97	3.42	4.37	3.91	4.75	6.55
4	5	3.21	3.66	4.61	4.15	4.99	6.79
4.5	5.5	3.44	3.89	4.84	4.38	5.22	7.02
5	6	3.67	4.12	5.07	4.61	5.45	7.25
5.5	6.5	3.89	4.34	5.29	4.83	5.67	7.47
6	7	4.11	4.56	5.51	5.05	5.89	7.69
6.5	7.5	4.23	4.77	5.72	5.26	6.10	7.90
7	8	4.52	4.97	5.92	5.46	6.30	8.10
7.5	8.5	4.72	5.17	6.12	5.66	6.50	8.30
8	9	4.91	5.36	6.31	5.85	6.69	8.49
8.5	9.5	5.10	5.55	6.50	6.04	6.88	8.68
9	10	5.28	5.73	6.68	6.22	7.06	8.86

Table 3. k-factors with different HAQ control positions for Halton Rex RXP, Standard model in l/s

*Nozzle types: C = Medium, D = Large, E = Extra large

Position of HAQ control	Control signal voltage v	k-factor [m^3/h], total airflow (Standard model)					
		600			1200		
		C*	D*	E*	C*	D*	E*
0 / closed / no HAQ	0-1	4.00	5.62	9.04	7.38	10.40	16.88
0.5	1.5	5.02	6.64	10.06	8.40	11.43	17.91
1	2	6.02	7.64	11.06	9.40	12.43	18.91

Position of HAQ control	Control signal voltage v	k-factor [m^3/h], total airflow (Standard model)					
		600			1200		
		C*	D*	E*	C*	D*	E*
1.5	2.5	7.00	8.62	12.04	10.38	13.40	19.88
2	3	7.95	9.57	12.99	11.34	14.36	20.84
2.5	3.5	8.88	10.50	13.92	12.27	15.29	21.77
3	4	9.80	11.42	14.84	13.18	16.20	22.68
3.5	4.5	10.68	12.30	15.72	14.07	17.09	23.57
4	5	11.55	13.17	16.59	14.93	17.96	24.44
4.5	5.5	12.39	14.01	17.43	15.78	18.80	25.28
5	6	13.22	14.84	18.26	16.60	19.62	26.10
5.5	6.5	14.02	15.64	19.06	17.40	20.42	26.90
6	7	14.79	16.41	19.83	18.18	21.20	27.68
6.5	7.5	15.55	17.17	20.59	18.93	21.96	28.44
7	8	16.28	17.90	21.32	19.67	22.69	29.17
7.5	8.5	16.99	18.61	22.03	20.38	23.40	29.88
8	9	17.68	19.30	22.72	21.07	24.09	30.57
8.5	9.5	18.35	19.97	23.39	21.73	24.76	31.24
9	10	18.99	20.61	24.03	22.38	25.40	31.88

Table 4. k-factors with different OMD control positions for Halton Rex RXP, Standard model in m^3/h

*Nozzle types: C = Medium, D = Large, E = Extra large

Halton Rex RXP, Flexible model

Position of OMD control	Control signal voltage for electric actuator [V]	k-factor [l/s], total airflow (Flexible model)	
		600	1200
0.0		0.11	0.34
0.5		0.11	0.35
1.0		0.81	0.68
1.5		1.40	1.24
2.0		1.66	1.82
2.5		1.81	2.36
3.0		1.95	2.76
3.5		2.09	3.16
4.0		2.23	3.56
4.5		2.69	3.77
5.0		3.17	4.28
5.5		3.67	4.83
6.0		4.09	5.35
6.5		4.56	5.99
7.0		5.05	6.50
7.5		5.47	7.09
8.0		5.89	7.68
8.5		6.20	8.16
9.0		6.53	8.64
9.5		6.75	9.03
10.0		6.77	9.03

Table 5. k-factors with different OMD control positions for Halton Rex RXP, Flexible model in l/s

Position of OMD control	Control signal voltage for electric actuator [V]	k-factor [m^3/h], total airflow (Flexible model)	
		600	1200
0.0		0.40	1.22
0.5		0.40	1.26
1.0		2.92	2.45
1.5		5.04	4.46
2.0		5.98	6.55

Position of OMD control	Control signal voltage for electric actuator [V]	k-factor [m^3/h], total airflow (Flexible model)	
		600	1200
2.5		6.52	8.50
3.0		7.02	9.94
3.5		7.52	11.38
4.0		8.03	12.82
4.5		9.68	13.57
5.0		11.41	15.41
5.5		13.21	17.39
6.0		14.72	19.26
6.5		16.42	21.56
7.0		18.18	23.40
7.5		19.69	25.52
8.0		21.20	27.65
8.5		22.32	29.38
9.0		23.51	31.10
9.5		24.30	32.51
10.0		24.37	32.51

Table 6. k-factors with different OMD control positions for Halton Rex RXP, Flexible model in m^3/h

Halton Rex RXP, Autonomic model

Control signal voltage for electric actuator [V]	k-factor [l/s], total airflow (Autonomic model)	
	600	1200
0.0	0.11	0.35
0.5	0.11	0.36
1.0	0.26	0.53
1.5	1.10	0.95
2.0	1.56	1.44
2.5	1.73	1.91
3.0	1.87	2.44
3.5	1.93	3.02
4.0	1.99	3.34
4.5	2.06	3.64
5.0	2.59	3.76
5.5	3.09	4.28
6.0	3.52	4.80
6.5	3.97	5.34
7.0	4.43	5.87
7.5	4.87	6.40
8.0	5.30	6.93
8.5	5.70	7.46
9.0	6.03	8.00
9.5	6.37	8.47
10.0	6.68	8.79

Table 7. k-factors with different OMD control positions for Halton Rex RXP, Autonomic model in l/s

Control signal voltage for electric actuator [V]	k-factor [m^3/h], total airflow (Autonomic model)	
	600	1200
0.0	0.40	1.26
0.5	0.40	1.30
1.0	0.94	1.91
1.5	3.96	3.42
2.0	5.62	5.18

Control signal voltage for electric actuator [V]	k-factor [m^3/h], total airflow (Autonomic model)	
	600	1200
2.5	6.23	6.88
3.0	6.73	8.78
3.5	6.95	10.87
4.0	7.16	12.02
4.5	7.42	13.10
5.0	9.32	13.54
5.5	11.12	15.41
6.0	12.67	17.28
6.5	14.29	19.22
7.0	15.95	21.13
7.5	17.53	23.04
8.0	19.08	24.95
8.5	20.52	26.86
9.0	21.71	28.80
9.5	22.93	30.49
10.0	24.05	31.64

Table 8. k-factors with different OMD control positions for Halton Rex RXP, Autonomic model in m^3/h

Example 1:

The measured static chamber pressure is 70 Pa for RXP/S-E-600, and the position of the HAQ control is 3. The total airflow rate is 4.12*√(70) ≈ 34.3 l/s.

Example 2:

The OMD pressure measured from the measurement tap in RXP/F-F-600 S3 is 75 Pa. RXP/F-F-600 S3 is equipped with the manual actuator. The positions of the manual actuator can be moved with the handle shown in *Fig. 27*. When the handle is moved to the position 3 (position of the handle according to the scale in the sticker behind the handle). For calculating the total airflow rate, the k-value is taken from Table 5, and calculated with the equation 1.95*√75 ≈ 17 l/s.

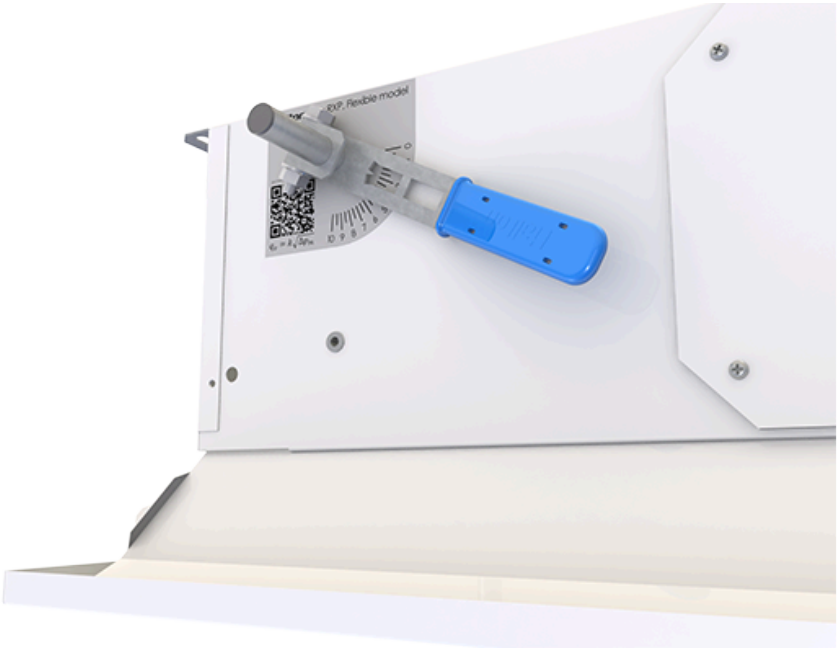

Fig. 27. Adjustment of the manual actuator position in Halton Rex RXP, Flexible model

3.1.3 Maintenance

The front panel of the Halton Rex RXP chilled beam is removable to allow general maintenance and cleaning.

For more information, please download the Halton Rex RXP, Standard model – Installation, commissioning and maintenance guide.

3.2 Halton Workplace WRA room automation system package for Halton Rex RXP chilled beam, Standard model (RXP/S)

3.2.1 Overview

Halton Workplace WRA is part of the Halton Workplace solution offering.

Fig. 28. Halton Workplace WRA room automation controller integrated to Halton Rex RXP chilled beam

Halton Workplace WRA is a controller especially designed for controlling the automation system of office spaces and meeting rooms. It is used for controlling the ventilation airflow, room temperature, and indoor air quality.

The Halton Workplace WRA room automation package consists of a controller and optional components depending on customer needs: a wall panel and sensors for temperature, CO_2, occupancy, pressure, and condensation.

There are options available for the controller and wall panel, depending on the number of controls and sensors required. The Halton Workplace WRA room automation controller is always combined with other Halton products for adaptable and high-level indoor climate.

Application area

- Controlling the ventilation airflow, room temperature, and indoor air quality in office spaces and meeting rooms
- The Halton Workplace WRA room automation controller is an important part of the Halton Workplace system, controlling room units and airflow control dampers
- The Halton Workplace system includes the following:
  - Room air conditioning applications with Halton Workplace WRA room automation controller:
    - Active chilled beams
    - Exhaust units
    - VAV dampers
    - Active VAV diffusers

- Halton Max MDC zone control dampers
- Halton Workplace WSO system optimiser

Key features

- Factory-tested controller and wiring, easy to install
- Pre-installed project-specific parameters, quick to commission
- Several operating modes based on occupancy, thermal comfort, and indoor air quality
- Enables fully flexible layout solutions for changing needs in office environments
- Highly energy-efficient and reliable system operation

3.2.2 Operating principle

The Halton Workplace WRA room automation controller operates with the Variable Air Volume (VAV) dampers, active chilled beams, radiant panels, and supply air diffusers of a Halton Workplace system. These are used for adjusting the ventilation airflow, room temperature, and indoor air quality in office spaces.

Each room unit in an office space can have its own dedicated Halton Workplace WRA room automation controller, or a single controller can control multiple room units. The Halton Workplace WRA room automation controller can automatically adjust the system according to the indoor environment level preferred by users. Each room unit having its own dedicated controller brings maximum flexibility.

3.2.3 Room automation: Halton Rex RXP active chilled beams with HAQ control and Halton PTS damper, controlled with Halton Workplace WRA room automation controllers

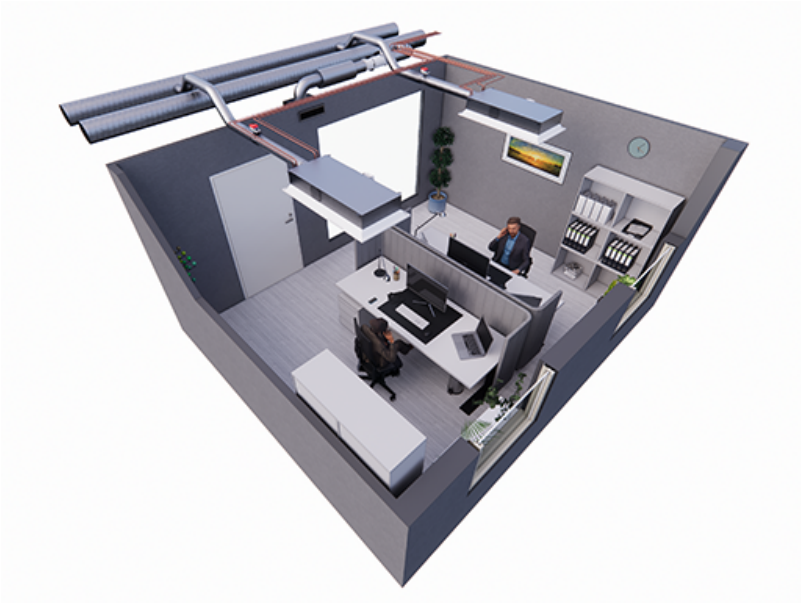

Fig. 29. Halton Rex RXP active chilled beams with HAQ control and Halton PTS damper, controlled with Halton Workplace WRA room automation controllers in a meeting room

Room automation description

In this configuration, two Halton Workplace WRA room automation controllers (type DXR2.E18-102A) control two Halton Rex RXP active chilled beams. Each chilled beam has heating and cooling valves, motorised Halton Air Quality (HAQ) control, as well as integrated CO_2, pressure and condensation sensors. A Halton PTS single-

blade damper is used for controlling the minimum operating mode. The system also includes an exhaust VAV damper, window switch control, external occupancy sensor and a wall panel (type QMX3.P37) with a temperature sensor and display. One Halton Workplace WRA room automation controller can individually control up to four room units, and there can be several Halton Workplace WRA room automation controllers in the room.

Design criteria for room automation

- Chilled beam has heating and cooling valves
- Chilled beam has motorised HAQ control
- Chilled beam has integrated CO_2, pressure, and condensation sensors
- External occupancy sensor
- Wall panel with temperature sensor and display
- Window switch control
- Optional PTS damper for controlling minimum airflow
- Exhaust airflow control

Schematic drawing

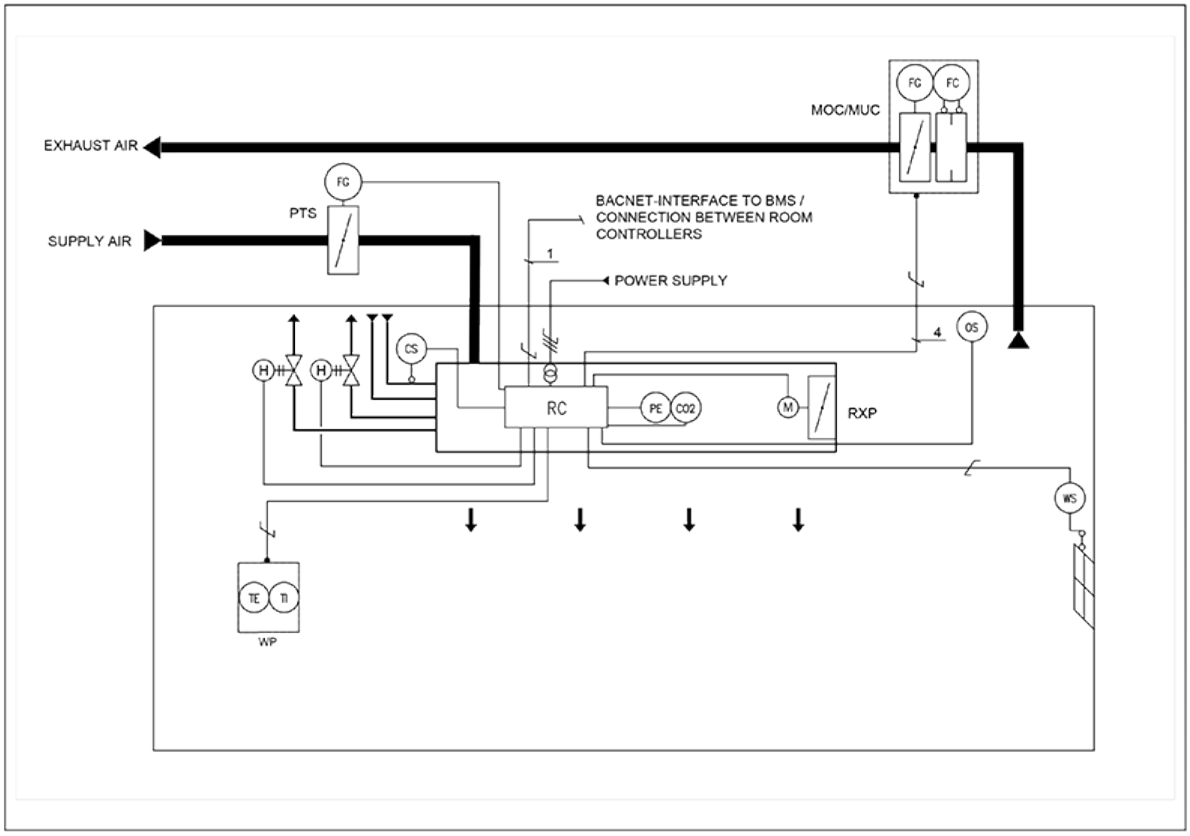

Fig. 30. Schematic drawing: Halton Rex RXP chilled beam (4-pipe) controlled with Halton Workplace WRA room automation controller

Equipment list

Code	Equipment
RC	Controller unit

Code	Equipment
FG	Airflow damper actuator
FC	Airflow measurement
H	Water valve actuator
CS	Condensation sensor
OS	Occupancy sensor
PE	Pressure sensor
CO2	CO_2 sensor
WP	Wall panel
TE	Temperature sensor
TI	Temperature display
WS	Window switch control

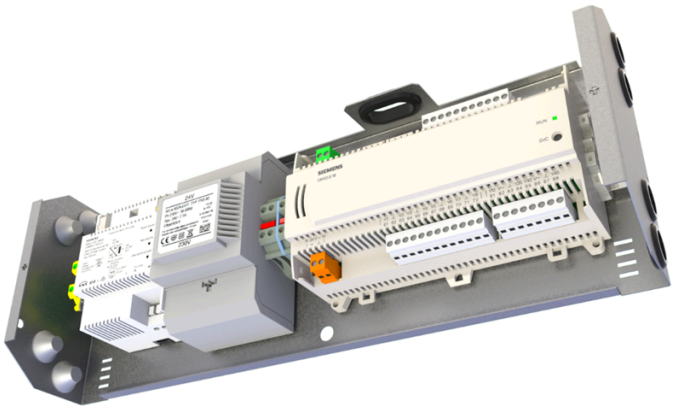

Fig. 31. Factory-installed Halton Workplace WRA room automation controller, type DXR2.E18-102A

Wiring diagram

For the wiring diagram of a similar configuration, see the product page of the Halton Workplace WRA room automation controller, section *Installation information*.

Components and order code examples for the system

- 2 x Active chilled beam: Halton Rex RXP
  RXP/C-1200-S2, TC=H, AQ=MO, CO=SW, ZT=N
- 1 x Exhaust unit: Halton AGC exhaust grille + Halton PRL plenum for grilles
  AGC/N-400-100 FS=CL, ME=A, FI=PN, CO=W, ZT=N+PRL/F-400-100-160
- 1 x VAV damper: Halton Max Ultra Circular (MUC) or Halton Max One Circular (MOC)
  MUC/G-160, MA=CS
- 2 x standby, shut-off damper: Halton PTS
  PTS/A-125, MA=CS, MO=B4, ZT=N
- Automation package: 2 x Halton Workplace WRA room automation controller unit with related components

WRA/RXP-E81-H3-EX4, WP=37, LC=NA, SE=CI, SW=NC, ST=IA, SL=OI, PM=P1, TC=H, CV=SP5, RV=NA, ZT=N

Note: For more information, see the product page of the Halton Workplace WRA room automation controller.

3.2.4 Cooling and heating water valve selection in Halton Workplace WRA room automation system package

Water valve selection is done in the Halton Workplace WRA room automation system package. Water valve sizing depends on the number of secondary and primary chilled beam units that are controlled with a single controller. One water valve is used to control the whole chilled beam group cooling or heating operated by one room controller. The water valve is sized for the whole group when there are multiple chilled beams controlled with single controller unit. There can be one primary chilled beam with a room controller and up to three secondary chilled beams. Water valve sizing for 1-4 chilled beams is shown below.

Number of chilled beams (pcs.)	Water valve type	Size for cooling (DN)	Size for heating (DN)	Installation
1	ABQM	DN15	DN15	Integrated to chilled beam
2	ABQM	DN20	DN15	Loose
3	ABQM	DN20	DN15	Loose
4	ABQM	DN25	DN15	Loose

Number of chilled beams (pcs.)	Water valve type	Size for cooling (DN)	Size for heating (DN)	Installation
1	VVP46..	DN15	DN15	Loose
2	VVP46..	DN20	DN15	Loose
3	VVP46..	DN20	DN15	Loose
4	VVP46..	DN25	DN15	Loose

4 Technical reference data

4.1 Connection diagrams

Halton Rex RXP, Standard model

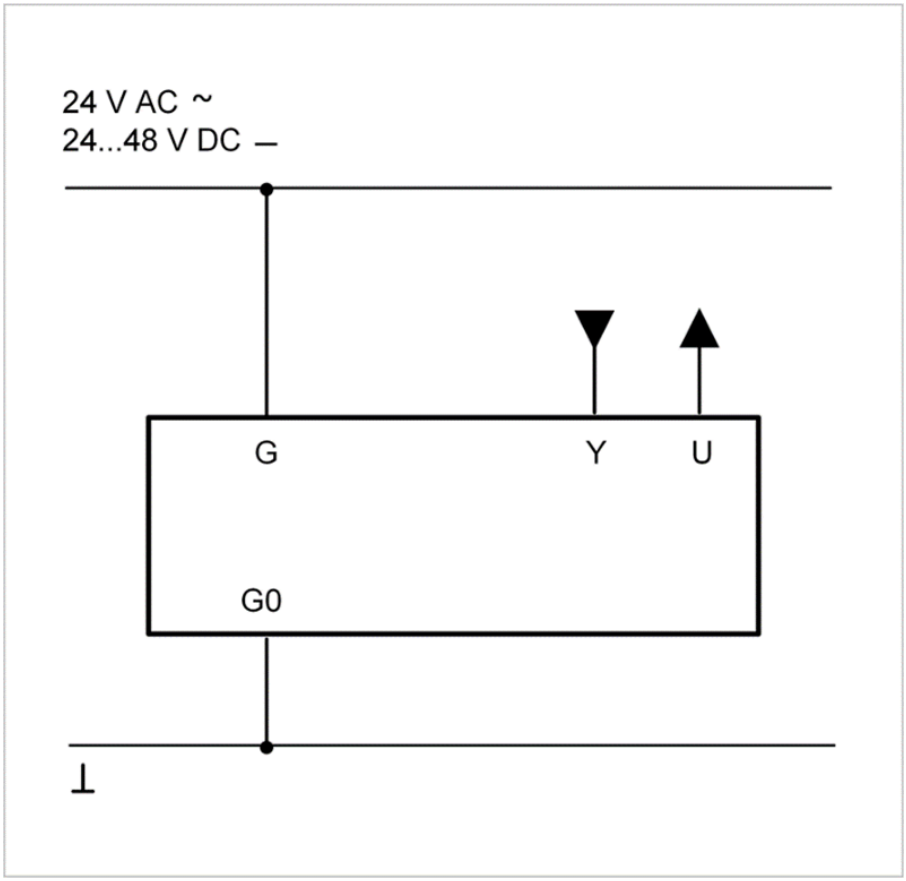

Fig. 32. Connection diagram for Halton Rex RXP, Standard model HAQ control

Connection	No.	Colour	Comment
G	1	Red	24 V AC/24...48 V DC
G0	2	Black	Ground
Y	8	Grey	0...10 V DC. Control signal in for HAQ position. The voltage corresponds to the HAQ openings and k-factors.
U	9	Pink	0...10 V DC. Feedback signal out indicating the HAQ position.

Halton Rex RXP, Flexible model

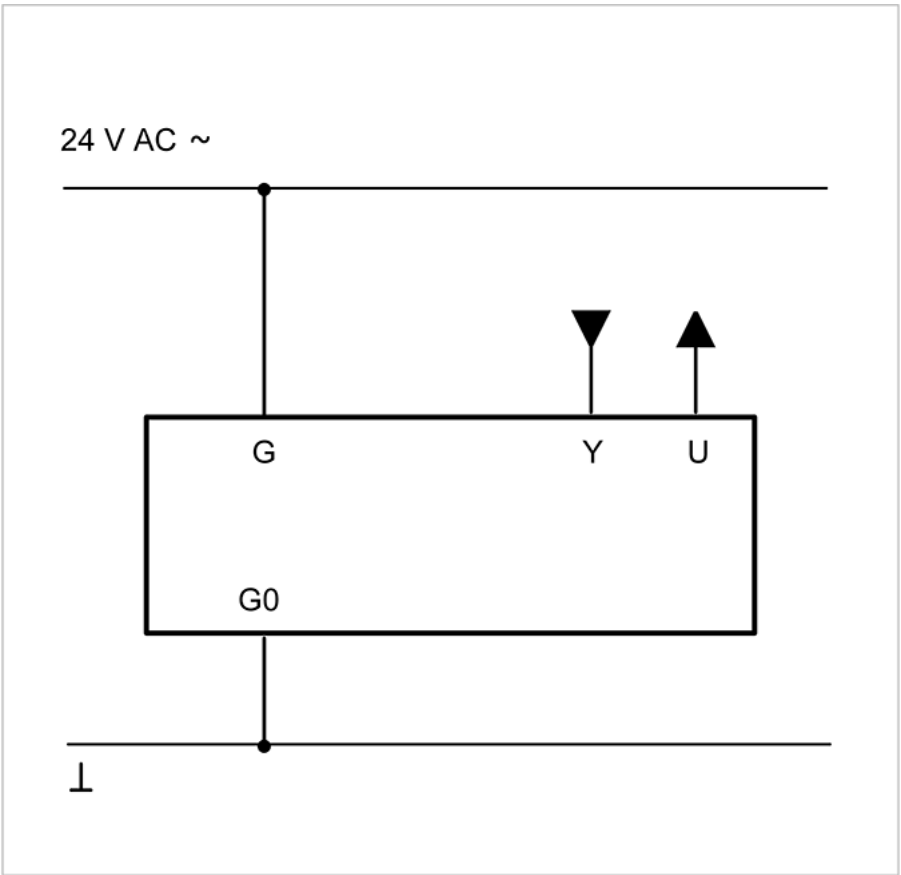

Fig. 33. Connection diagram for Halton Rex RXP, Flexible model OMD control

Connection	No.	Colour	Comment
G	1	Red	24 V AC
G0	2	Black	Ground
Y	8	Grey	0...10 V DC. Control signal in for OMD position. The voltage corresponds to the OMD openings and k-factors.
U	9	Pink	0...10 V DC. Feedback signal out indicating the OMD position.

Halton Rex RXP, Autonomic model

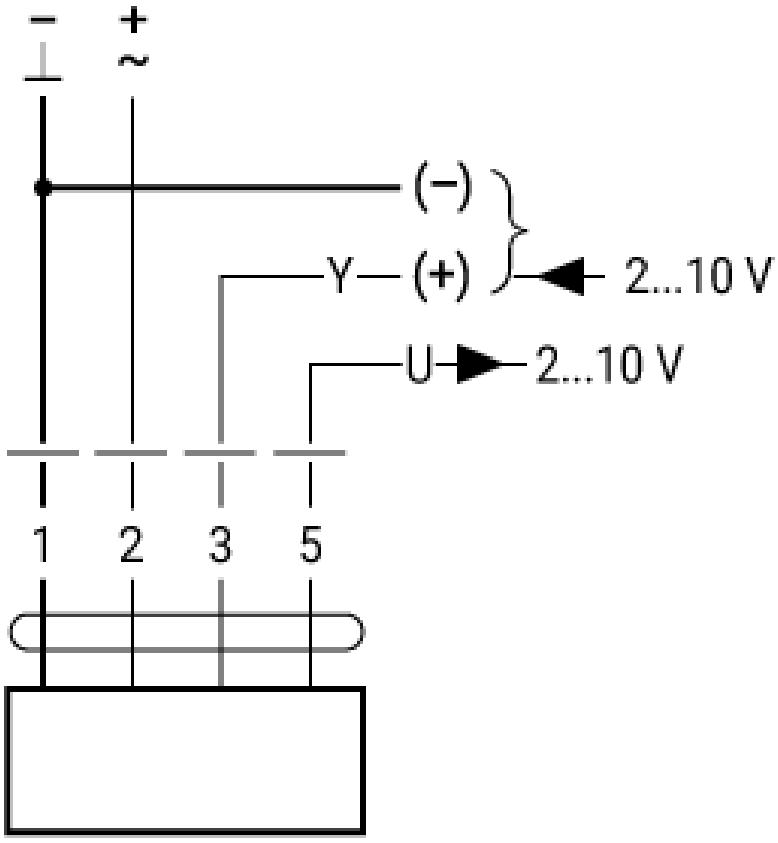

Fig. 34. Connection diagram analog for Halton Rex RXP, Autonomic model

No.	Designation	Cable colour	Function
1	⊥ -	Black	AC/DC 24 V supply
2	~ +	Red	
3	◀ Y	White	Reference signal/Override/Sensor
5	▶ U	Orange	- Actual value signal - MP-Bus connection

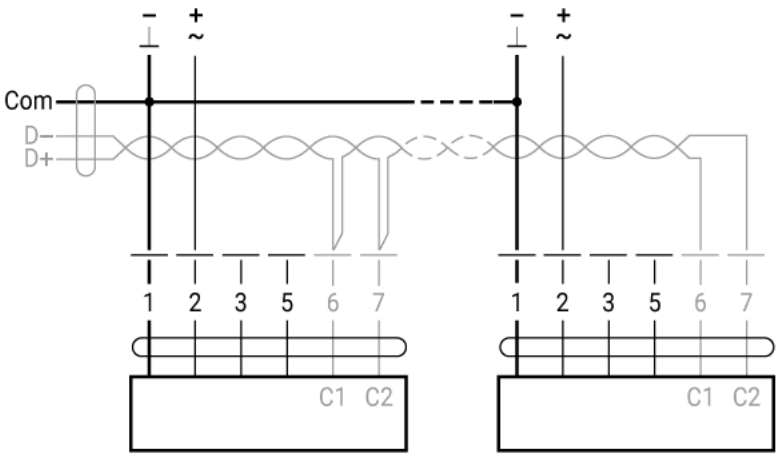

Fig. 35. Connection diagram BACnet/Modbus for Halton Rex RXP, Autonomic model

No.	Designation	Cable colour	Function
1	⊥ -	Black	AC/DC 24 V supply
2	~ +	Red	
6	D-	Pink	BACnet/Modbus (RS485)
7	D+	Grey	

Terminals

Terminal	Name	Comment
1	GND	Ground
2	24 V DC/AC	Power supply input
3	GND	Ground
4	Standard RS-485 B	Data receive/send line B -
5	Standard RS-485 A	Data receive/send line A +
6	GND	Ground
7	AI3	Input for NTC 10k temperature sensor
8	GND	Ground
9	AI1	Input for airflow or damper control signal
10	GND	Ground
11	AO1	Output for airflow or damper feedback signal
12	AI2	Analog actuator feedback signal

Terminal	Name	Comment
13	AO2	Analog actuator reference signal
14	GND	Ground
15	24 V DC/AC	Power supply output for the analog actuator