CIVIC EC LB
CIVIC EC DB

Single-room ventilation for schools and public premises

BLAUBERG Ventilatoren

WHY DO WE NEED VENTILATION?

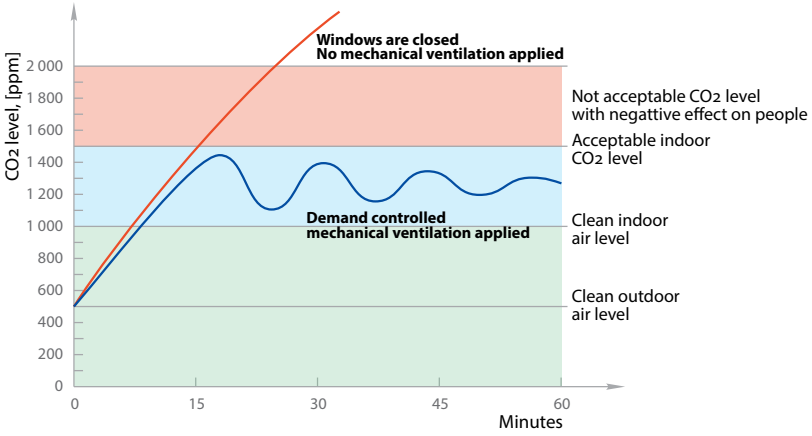
Bad air quality

Insufficient ventilation in school classes, offices and conference halls results in bad air quality, i.e. high humidity level and CO_2 concentration, low oxygen level. That provokes well known symptoms like dryness and irritation of ocular mucosa, lack of concentration, fatigue.

Bad air quality was proved to be the reason of work capacity reduction by 5-10 % for adults. Children are affected even more. Thus bad air quality is one of the factors that impair success level of children at schools.

High humidity may lead to growth of mold and germs in a building, which means a risk of asthma and allergy attacks. Quality ventilation is one of the key factors to prevent such diseases.

Window ventilation is a standard ventilation solution, but this method has a short effect and it also leads to heat losses. Window ventilation is not able to solve a problem of high CO_2 concentration, which several times exceeds a permissible level. Single-room ventilation, as opposed to window ventilation, provides a stable good air quality and saves heat energy.



Problem with heat losses

Reduction of heating costs is one of the main targets to be solved by reconstruction of schools and other public premises. Modern windows and doors are a part of this energy saving strategy due to their high density. At the same time airtight premises require efficient ventilation with heat recovery to maintain high air quality with low energy demand.

Limited mounting space for ventilation in reconstructed premises

Reconstruction of old buildings poses many engineering challenges requiring non-standard solutions. Arrangement of efficient ventilation system is one of such targets. However very often there is not enough space for mounting of air ducts and ventilation in renovated premise. In this case central ventilation is infeasible.

Engineers select the single-room ventilation as it offers required ventilation solutions without the need to mount air ducts. It can be installed directly in the room to be ventilated.

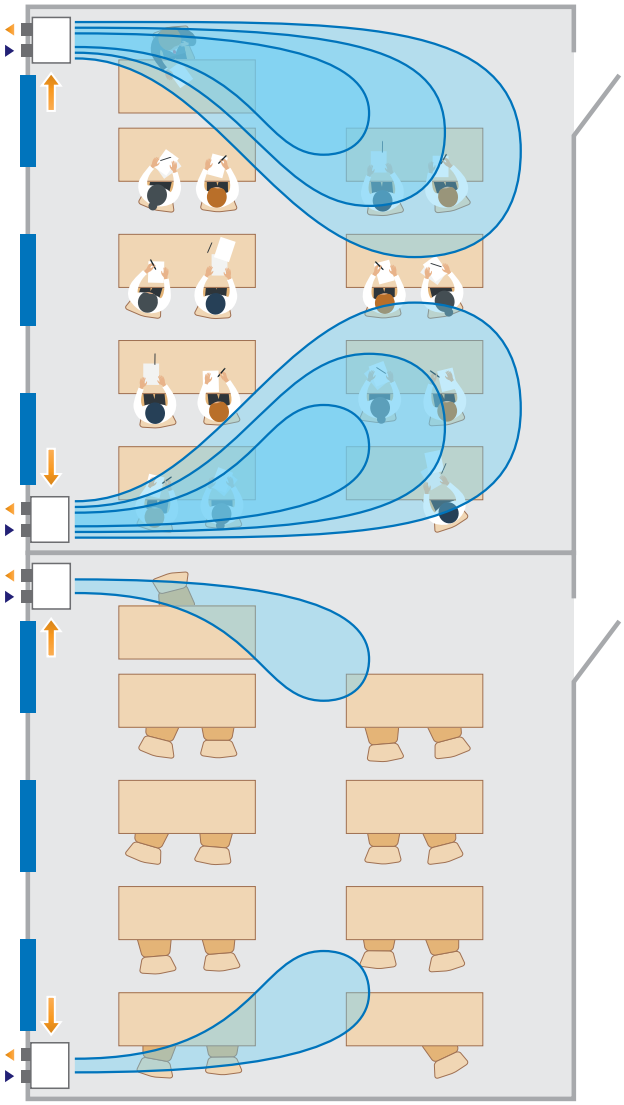
Advantages of the single-room ventilation

- Air capacity and type of a ventilation unit are selected to meet the individual demands of a separate room.
- Ventilation for each premise is regulated for each premise individually, in required time and volume. The CIVIC air handling units have automated air speed control to maintain required air quality.
- Fresh air is supplied through a short air duct built into the wall. No energy is wasted to overcome air resistance typical for long air ducts.
- Single-room ventilation increases fire safety of the rooms as there is no duct connection between the rooms.

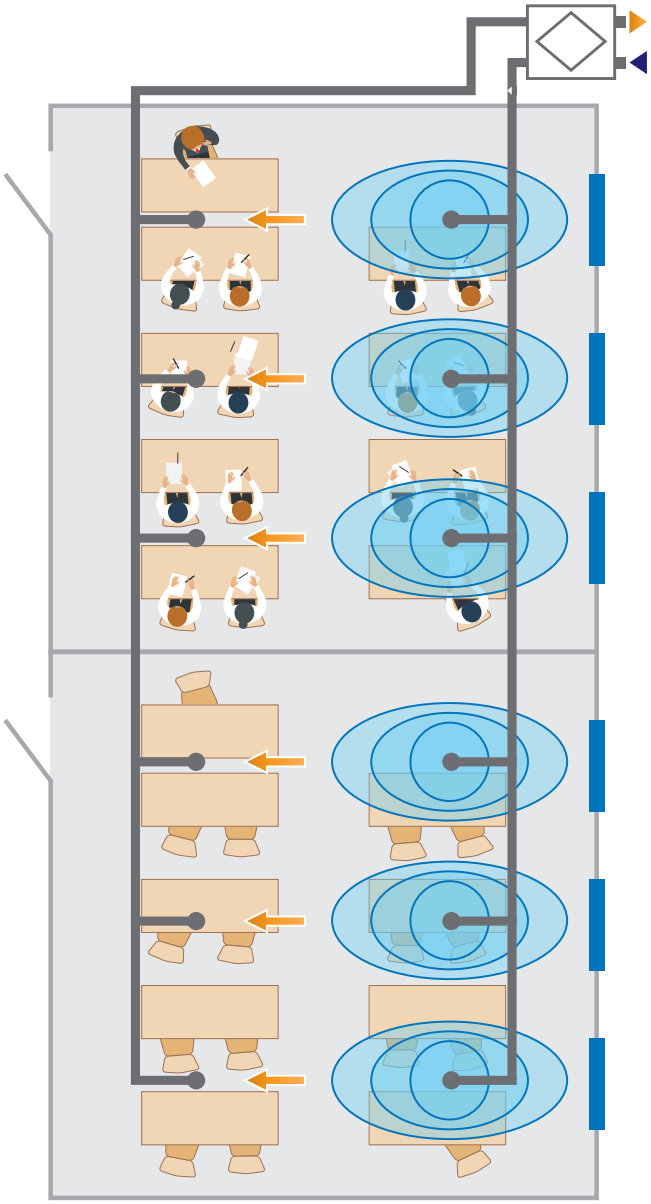
Disadvantages of the central ventilation:

- Big overall dimensions of a central ventilation unit require a lot of mounting space.
- A lot of time for calculation and designing of ductworks whereas a single-room ventilation means no air ducts.
- Sufficient space for ducts layout under the ceiling and the need to conceal the air ducts behind a dropped ceiling. However this solution is often difficult to implement during reconstruction.
- High electricity consumption of a central ventilation unit caused by air resistance in the air ducts.
- Complicated air exchange control of separate premises due to various loads often results in excessive or insufficient ventilation in these premises.

High speed ventilation



Low speed ventilation



Ventilation is permanent ON

SINGLE-ROOM VENTILATION

CIVIC EC LB

Floor-mounted single-room air handling units with max. air capacity 580 m³/h enclosed in a heat- and sound-insulated casing. Heat recovery efficiency up to 97 %.

CIVIC EC DB

Ceiling-mounted single-room air handling units with max. air capacity 510 m³/h enclosed in a heat- and sound-insulated casing. Heat recovery efficiency up 94 %.

The **CIVIC EC LB** and **CIVIC EC DB** units are designed for single-room ventilation of schools, offices and other public and commercial premises. Offer the ideal simple and efficient ventilation solutions for existing and renovated buildings and require no layout of air ducts.

Features

- Efficient supply and extract ventilation for separate premises.
- Available modifications with an integrated pre-heater and reheater for cold climate applications.
- EC fans with low energy consumption.
- Low-noise operation.
- Supply air filtration with two built-in filters of G4 and F8 filtration rate and optional carbon and HEPA filters.
- Simple mounting.

DESIGN

Casing

Made of high-quality polymer coated steel, internally lined with heat- and sound insulation.
Due to the modern design the unit is compatible with any interior.

Air dampers

The automatic supply and extract air dampers are used to prevent uncontrollable air draughts during the unit standstill.

Fans

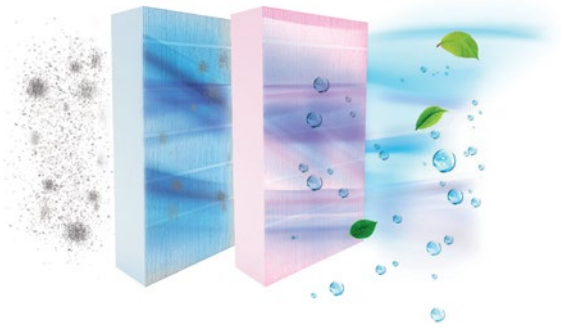
High efficient electronically commutated motors with external motor and impeller with forward curved blades. Such motors are the most state-of-the-art energy saving solution. EC motors are featured with high performance and total speed controllable range. High efficiency reaching 90% is the premium advantage of the electronically commutated motors.

Bypass

The units are equipped with a bypass. The bypass damper opens for free cooling ventilation mode in summer.

Air filtration

Supply air is cleaned with G4 and F8 (PM2.5 > 75%) supply cassette air filters. For premises requiring high air quality it is recommended to install carbon F8 filters and H11 (PM2.5 > 95%) filters. Available as specially ordered accessories.
Cassette G4 filter is used for extract air filtration.



Preheating

Optionally the units may be equipped with an electric pre-heater for freeze protection of the heat exchanger.

Reheating

Optionally the units may be equipped with an electric reheater for warming up of supply air.

Heat exchanger

The **CIVIC EC LB** unit has a counter-flow heat exchanger made of polystyrene and aluminium. The **CIVIC EC DB** unit has a counter-flow heat exchanger made of aluminium.

In cold season the heat energy of the extract air flow is absorbed by intake air flow, thus decreasing the heat losses caused by ventilation. Condensate generated during heat recovery is collected in a drain pan and removed to the sewage system.
In warm season the heat of the outdoor air is absorbed by extract air flow. This way the supply air temperature decreases and heat recovery reduces operation loads for the air conditioner.

The **CIVIC EC LB E** unit is equipped with a counter-flow heat exchanger made of enthalpy membrane.

In cold season the heat and moisture of the extract air are absorbed by supply air through the enthalpy membrane, thus decreasing the heat losses caused by ventilation.
In warm season the heat and moisture of the outdoor air is absorbed by extract air flow through the enthalpy membrane. This way the supply air temperature and humidity decreases and heat recovery reduces operation loads for the air conditioner.

Functioning

Cold outside air flows through the filters and heat exchanger and is moved to the room with a supply centrifugal fan.

Warm polluted air from the premise flows through the filter and the heat exchanger and is exhausted outside with an extract centrifugal fan.

Control

The ventilation units may be operated with an integrated or an external control panel.

Three available modifications of the control panel:

	S14 (only for Civic EC LB) 	**S17** 	**S18** 
Built-in control panel	●	●	●
External control panel	●	●	●
Preheater		●	●
Reheater		●	●
Humidity sensor	○	○	○
CO_2 sensor	○	○	○
Functions			
MODbus		○	○
Speed control from 0 to 100 %	●	●	●
Bypass control	Manual	Auto	Auto
Filter maintenance indicator	●	●	●
Alarm indicator	●	●	●
Timer scheduled operation		●	●
Week scheduled operation		●	●
Supply air temperature setup		●	●

●: Available | ○: Optional

Freeze protection

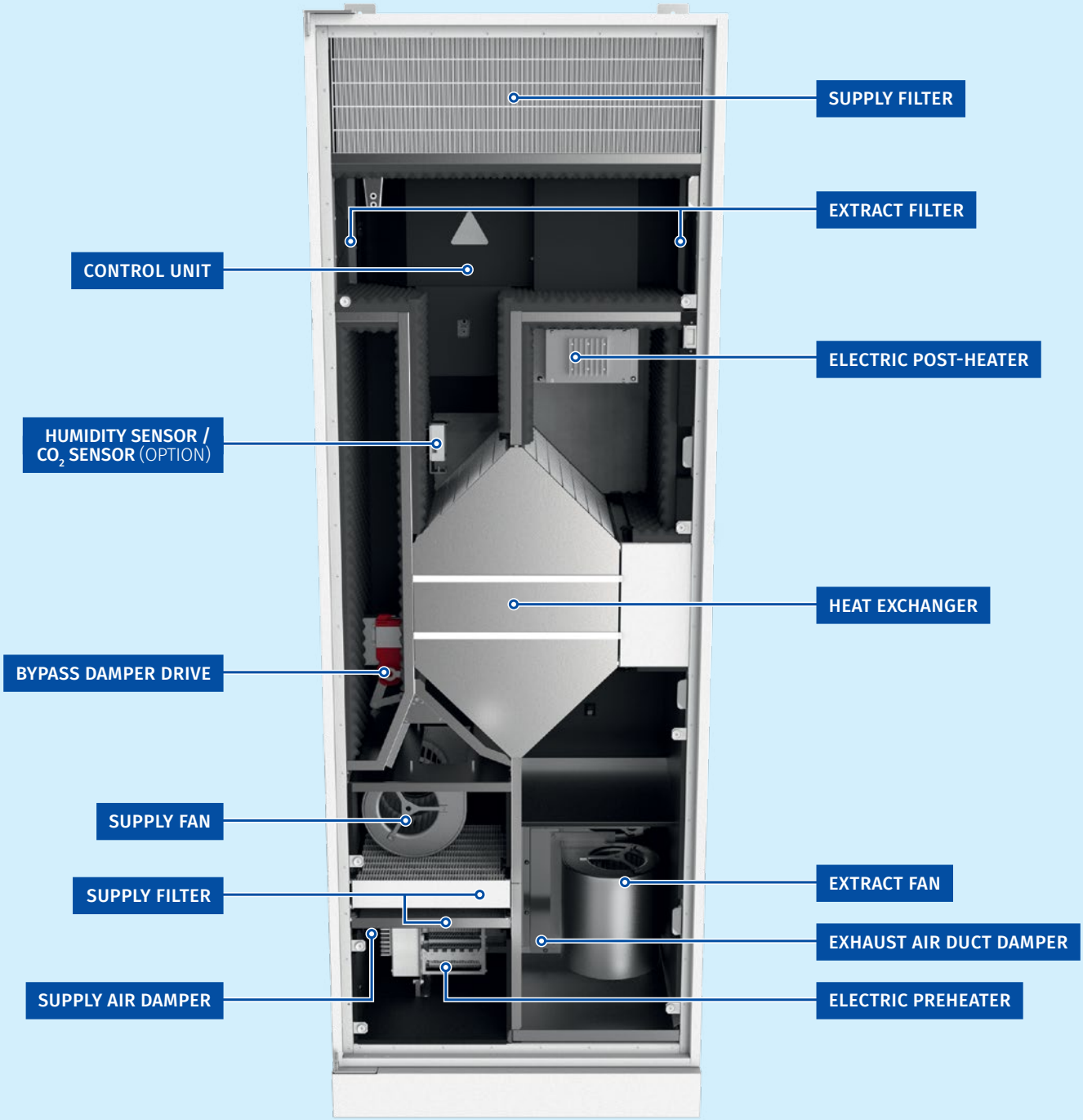
The freeze protection function may be realized by two ways.

- For the units without pre-heater: the supply fan shuts down on a signal from the exhaust air temperature sensor to let warm extract air flow warm up the heat exchanger. Then the supply fan turns on and the unit operates normally.
- For the units with a pre-heater: the supply air is warmed up before contacting the heat exchanger, thus preventing its freezing. In this case balanced air exchange is not interrupted.

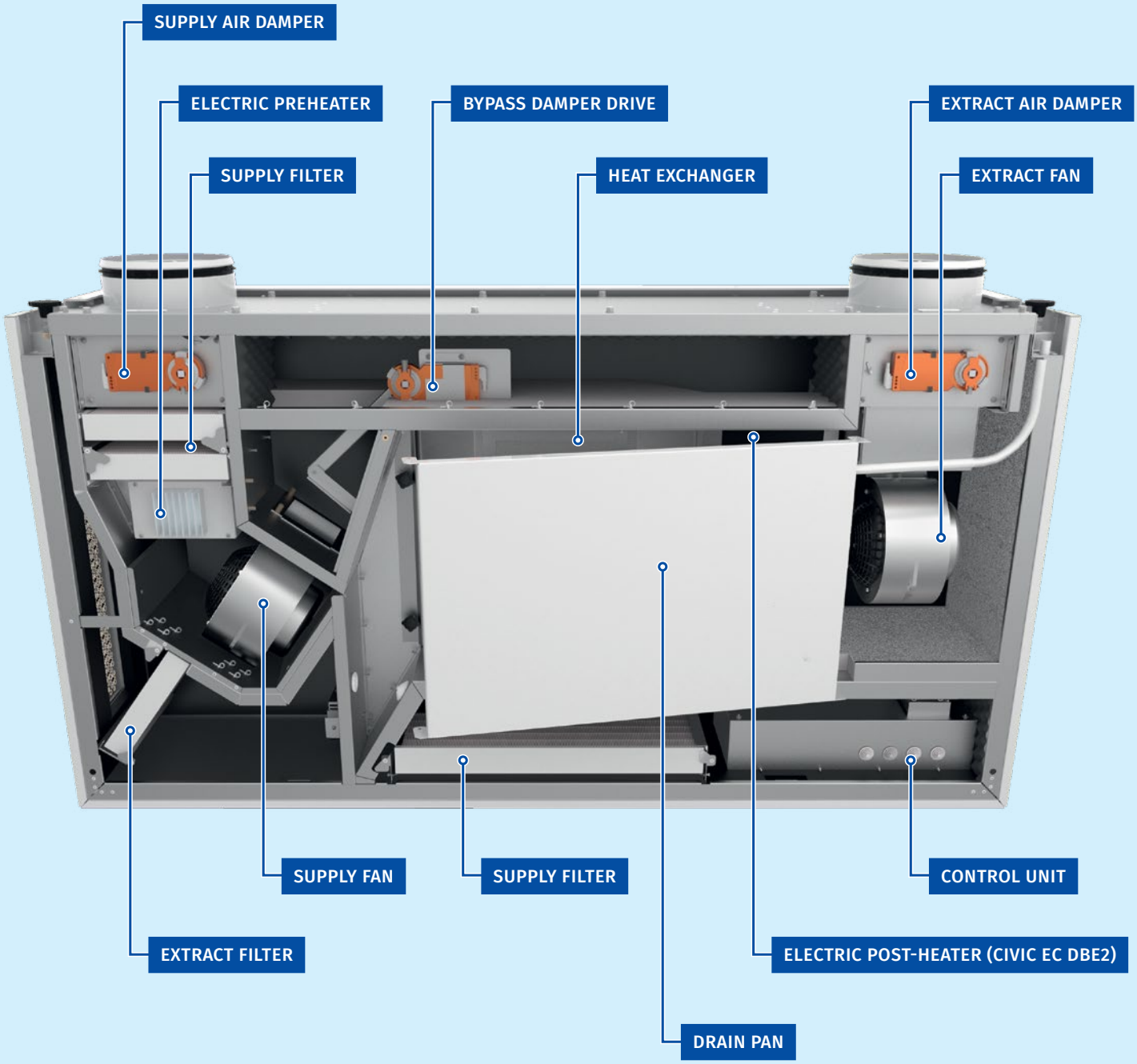
Designation key

Model	Motor type	Mounting	Bypass	Heater	Nominal air flow [m³/h]	Heat exchanger type	Control
CIVIC	**EC:** synchronous electronically commutated motor	**L:** floor mounting **D:** ceiling mounting	**B:** integrated bypass	**E:** preheating **E2:** preheating + post-heating	300; 500	**_:** heat recovery **-E:** energy recovery	**S14:** sensor control panel **S17:** th-Tune control panel **S18:** pGD control panel

CIVIC EC LB


SUPPLY FILTER
EXTRACT FILTER
CONTROL UNIT
ELECTRIC POST-HEATER
HUMIDITY SENSOR / CO_2 SENSOR (OPTION)
HEAT EXCHANGER
BYPASS DAMPER DRIVE
SUPPLY FAN
EXTRACT FAN
SUPPLY FILTER
EXHAUST AIR DUCT DAMPER
SUPPLY AIR DAMPER
ELECTRIC PREHEATER

CIVIC EC DB


SUPPLY AIR DAMPER
ELECTRIC PREHEATER
SUPPLY FILTER
BYPASS DAMPER DRIVE
HEAT EXCHANGER
EXTRACT AIR DAMPER
EXTRACT FAN
SUPPLY FAN
SUPPLY FILTER
CONTROL UNIT
EXTRACT FILTER
ELECTRIC POST-HEATER (CIVIC EC DBE2)
DRAIN PAN

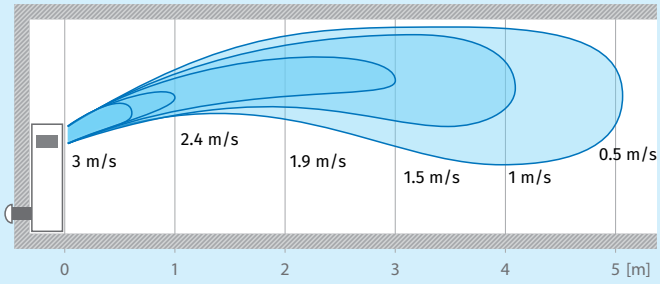
TECHNICAL DATA

CIVIC EC LB

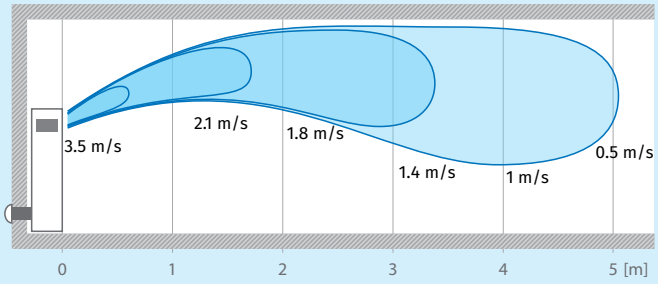
Parameters	CIVIC EC LB 300	CIVIC EC LBE 300	CIVIC EC LBE2 300	CIVIC EC LB 300-E	CIVIC EC LBE 300-E	CIVIC EC LBE2 300-E	CIVIC EC LB 500	CIVIC EC LBE 500	CIVIC EC LBE2 500
Voltage [V / 50 (60) Hz]	1~220-240								
Power consumption without heater(s) [W]	123	123	123	123	123	123	232	232	232
Preheater power consumption [W]	-	1400	1400	-	1400	1400	–	1400	1400
Reheater power consumption [W]	-	-	1400	-	-	1400	–	–	2800
Max. current consumption without heater(s) [A]	0,9	0,9	0,9	0,9	0,9	0,9	1,7	1,7	1,7
Max. current consumption with heater(s) [A]	0,9	7	13,1	0,9	7	13,1	1,7	7,8	20
Maximum air flow [m³/h (l/s)]	320 (89)	320 (89)	320 (89)	320 (89)	320 (89)	320 (89)	580 (161)	580 (161)	580 (161)
RPM [min⁻¹]	2150	2150	2150	2150	2150	2150	1280	1280	1280
Sound pressure level at 3 m [dBA]	35	35	35	35	35	35	35	35	35
Transported air temperature [°C]	-25...+50								
Casing material	painted steel								
Insulation	40 mm mineral wool								
Extract filter	G4								
Supply filter	G4 and F8 (Option: F8 Carbon; H11)								
Connected air duct diameter [mm]	200	200	200	200	200	200	250	250	250
Weight [kg]	138±3%	139±3%	140±3%	136±3%	137±3%	138±3%	191±3%	193±3%	194±3%
Heat exchanger type	counter-flow								
Heat exchanger material	polystyrene			enthalpy membrane			aluminium		
Heat recovery efficiency* [%]	82...97			76...90			79...93		
SEC class	A	A	A	A	A	A	A	A	A

*Heat recovery efficiency is specified in compliance with EN 13141-8.

Fresh air flow distance for CIVIC EC LB300



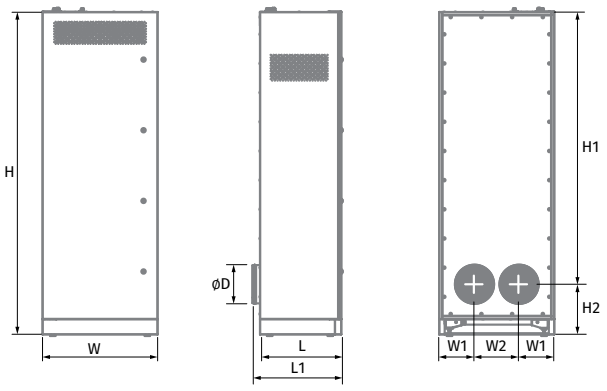
Fresh air flow distance for CIVIC EC LB500



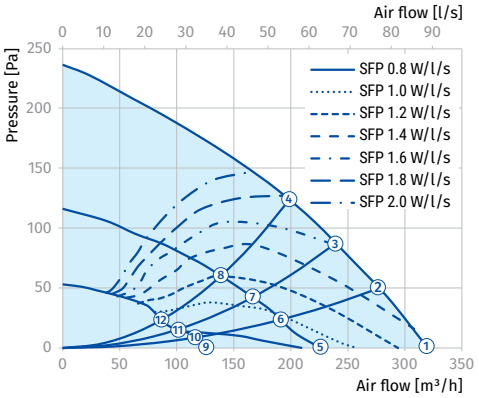
Overall dimensions [mm]

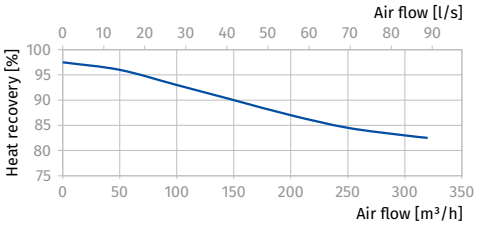
	D	H	H1	H2	L	L1	W	W1	W2
CIVIC EC LB300 (E)	200	1770	1476	294	470	520	620	230	195
CIVIC EC LB500	250	2170	1833	337	535	585	750	290	230

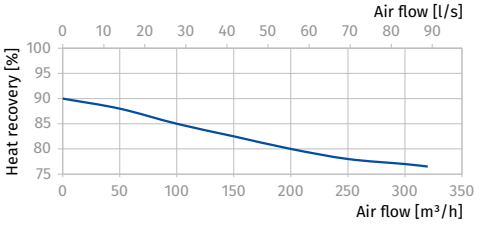
The unit is rated for indoor application with the ambient temperature ranging from +1 °C to +40 °C and relative humidity up to 80%.



CIVIC EC LB/LBE/LBE2 300(-E)



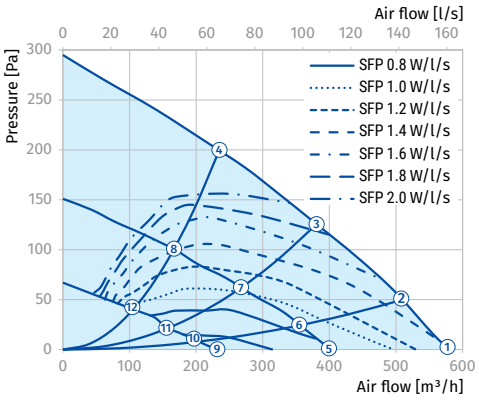


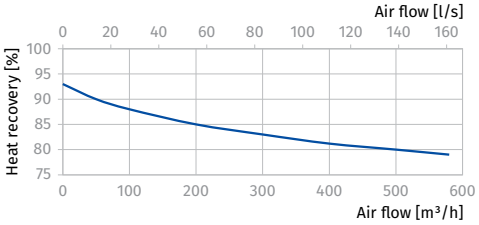


Unit power with no heater [W]

Point	CIVIC EC LB300(-E) CIVIC EC LBE300(-E) CIVIC EC LBE2 300(-E)
1	123
2	113
3	108
4	100
5	55
6	52
7	50
8	45
9	24
10	23
11	23
12	23

CIVIC EC LB/LBE/LBE2 500(-E)





Unit power with no heater [W]

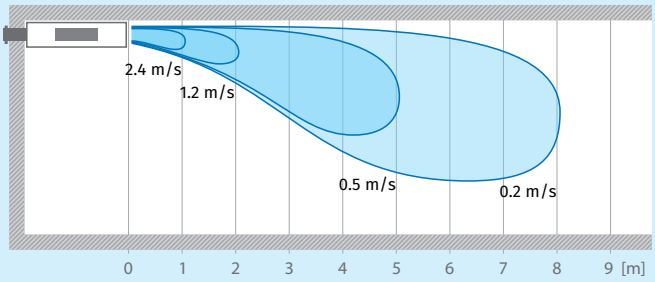
Point	CIVIC EC LB500 CIVIC EC LBE500 CIVIC EC LBE2 500
1	232
2	215
3	170
4	168
5	98
6	92
7	85
8	75
9	33
10	31
11	30
12	29

CIVIC EC DB

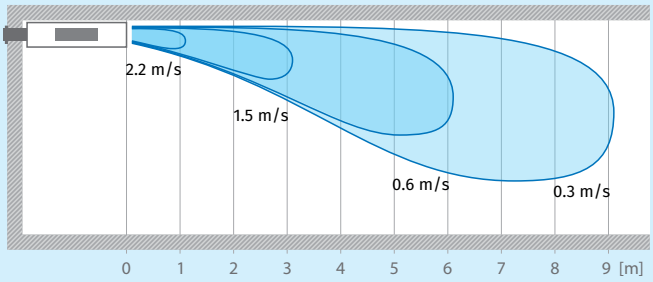
Parameters	CIVIC EC DB300	CIVIC EC DBE300	CIVIC EC DBE2 300	CIVIC EC DB500	CIVIC EC DBE500	CIVIC EC DBE2 500
Voltage [V / 50 (60) Hz]	1~230					
Power consumption without heater(s) [W]	175	175	175	230	230	230
Preheater power consumption [W]	–	1050	1050	–	1050	1050
Reheater power consumption [W]	–	–	1400	–	–	1400
Max. current consumption without heater(s) [A]	1.3	1.3	1.3	1.7	1.7	1.7
Max. current consumption with heater(s) [A]	–	7.3	13.6	–	7.2	13.5
Air flow [m³/h (l/s)]	300 (83)	300 (83)	300 (83)	510 (142)	510 (142)	510 (142)
RPM [min⁻¹]	2150	2150	2150	1700	1700	1700
Noise level @ 3 m [dBA]	22	22	22	24	24	24
Max. transported air temperature [°C]	-25...+50					
Casing material	polymer coated steel					
Insulation	40 mm, mineral wool					
Extract filter	G4					
Supply filter	G4 and F8 (Option: F8 Carbon; H11)					
Connected air duct diameter [mm]	200	200	200	250	250	250
Weight [kg]	78	79	80	103	104	105
Heat exchanger type	counter-flow					
Heat exchanger material	aluminum					
Heat recovery efficiency* [%]	79...91			79...94		
SEC class	A	A	A	A	A	A

*Heat recovery efficiency is specified in compliance with EN 13141-8.

Fresh air flow distance for CIVIC EC DB300



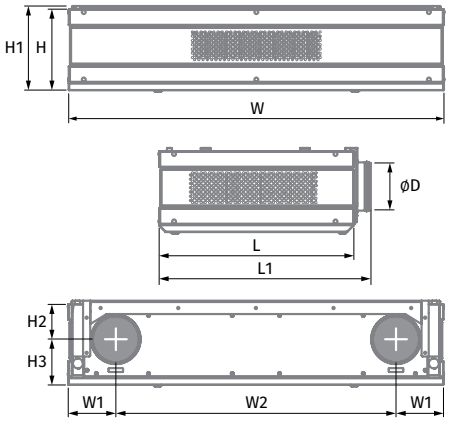
Fresh air flow distance for CIVIC EC DB500



Overall dimensions [mm]

	D	H	H1	H2	H3	L	L1	W	W1	W2
CIVIC EC DB300	199	333	347	145	188	806	873	1547	196	1155
CIVIC EC DB500	249	386	400	169	217	1006	1083	1806	244	1316

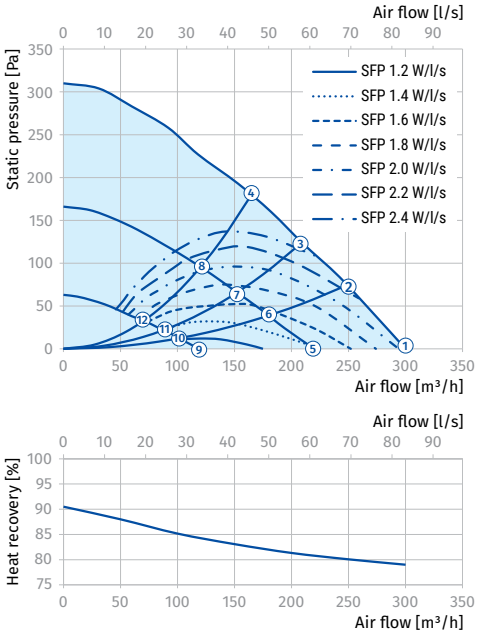
The unit is rated for indoor application with the ambient temperature ranging from +1 °C to +40 °C and relative humidity up to 80 %



CIVIC EC DB/DBE/DBE2 300

Sound power level, A-filter applied.

Sound-power level, A - weighted		General	Octave frequency band [Hz]								LpA, 3 m	LpA, 1 m
			63	125	250	500	1000	2000	4000	8000		
L_{WA} to environment @ point 1	dBA	**42**	27	30	32	36	37	35	27	25	**22**	**32**
L_{WA} to environment @ point 5	dBA	**35**	22	22	32	24	29	25	20	17	**15**	**25**
L_{WA} to environment @ point 9	dBA	**27**	12	16	19	19	15	21	17	17	**6**	**16**



Total power of the unit [W]

Point	CIVIC EC DB300 CIVIC EC DBE300 CIVIC EC DBE2 300
1	175
2	155
3	145
4	130
5	83
6	78
7	73
8	68
9	36
10	34
11	32
12	32

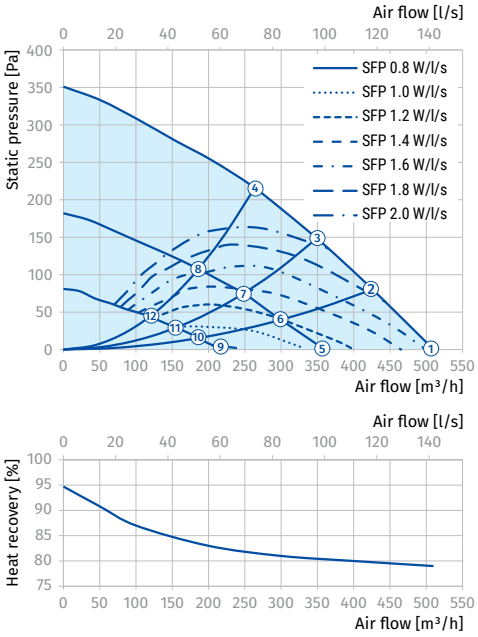
Total sound pressure level at 3 m (1 m) [dBA]

Point	CIVIC EC DB300 CIVIC EC DBE 300 CIVIC EC DBE2 300
1	22 (32)
2	21 (31)
3	21 (31)
4	20 (30)
5	15 (25)
6	15 (25)
7	15 (25)
8	15 (25)
9	6 (16)
10	6 (16)
11	6 (16)
12	6 (16)

CIVIC EC DB/DBE/DBE2 500

Sound power level, A-filter applied.

Sound-power level, A - weighted		General	Octave frequency band [Hz]								LpA, 3 m	LpA, 1 m
			63	125	250	500	1000	2000	4000	8000		
L_{WA} to environment @ point 1	dBA	**44**	22	28	38	41	37	33	25	16	**24**	**34**
L_{WA} to environment @ point 5	dBA	**40**	18	24	32	32	36	28	29	17	**19**	**29**
L_{WA} to environment @ point 9	dBA	**34**	10	17	22	21	33	18	18	17	**13**	**23**



Total power of the unit [W]

Point	CIVIC EC DB500 CIVIC EC DBE500 CIVIC EC DBE2 500
1	230
2	220
3	200
4	178
5	106
6	100
7	92
8	87
9	46
10	45
11	43
12	41

Total sound pressure level at 3 m (1 m) [dBA]

Point	CIVIC EC DB300 CIVIC EC DBE 300 CIVIC EC DBE2 300
1	24 (34)
2	23 (33)
3	23 (33)
4	22 (32)
5	19 (29)
6	19 (29)
7	19 (29)
8	18 (28)
9	13 (23)
10	13 (23)
11	13 (23)
12	13 (23)

ACCESSORIES

		Civic EC LB... 300 S17/S18	Civic EC LB... 300 S14	Civic EC LB... 500 S17/S18	Civic EC LB... 500 S14	CIVIC EC DB... 300 S17/S18	CIVIC EC DB... 500 S17/S18
G4 extract filter		FP 238x308x22 G4 PPI		FP 257x450x27 G4 PPI		FP 270x216x48 G4-PPI	FP 325x388x48 G4-PPI
G4 supply filter		FP 215x290x48 G4		FP 290x318x22 G4		–	
F8 supply filter		FP 275x384x60 F8		FP 290x318x60 F8		FP 270x218x48 F8	FP 325x314x48 F8
F8 carbon supply filter		FP 335x533x48 F8-C		FP 389x663x48 F8-C		FP 518x270x48 F8-C	FP 714x320x48 F8-C
H11 supply filter		FP 335x533x60 H11		FP 389x663x60 H11		FP 518x270x48 H11	FP 714x320x48 H11
Outer ventilation hood made of brushed stainless steel		AH Civic 300 LB chrome		AH Civic 500 LB chrome		–	
Outer ventilation hood made of white coated steel		AH Civic 300 LB white		AH Civic 500 LB white		–	
Outer grill		–		–		VDA 200 CFn Al	VDA 250 CFn Al
Humidity sensor		FS2					
External VOC sensor (0-10V)		DPWQ30600	–	DPWQ30600	–	DPWQ30600	
External CO_2 sensor (0-10V)		DPWQ40200	–	DPWQ40200	–	DPWQ40200	
External humidity sensor (0-10V)		DPWC11200	–	DPWC11200	–	DPWC11200	
Humidity sensor (NO)		HR-S					
Assembled U-trap		SFK 20x32					
Assembled drain pump		CP-2					

DESIGN RECOMMENDATIONS

In compliance with **DIN EN 15251** premises have category classifications and each category has definite air quality standards and air exchange rate.

Category	Description
1	High level of expectation. Recommended for rooms containing very sensitive individuals with particular requirements, e.g. individuals with disabilities, the sick, very young children and older people.
2	Normal level of expectation. Recommended for new and renovated buildings.
3	Reasonable, moderate level of expectation. Can be used for existing buildings.
4	Values outside the above categories. This category should be used only for a limited part of the year.

Recommendations for air exchange per each individual according to **DIN EN 13779** are shown in the next table. The stated values consider emissions of harmful substances from furniture and construction materials.

Category	Unit		Outside airflow rate							
			Non smoking area				Smoking area			
			Normal area		Standard value		Normal area		Standard value	
1	l/s/ person	m³/h/person	> 15	> 54	20	72	30	108	40	144
2	l/s/ person	m³/h/person	10-15	36-54	12.5	45	20-30	72-108	25	90
3	l/s/ person	m³/h/person	6-10	21.6-36	8	28.8	12-30	43.2-108	16	57.6
4	l/s/ person	m³/h/person	<6	<21.6	5	18	< 12	< 43.2	10	36

Minimum air capacity for each schoolchild on the basis of maximum permissible CO_2 concentration is as follows:

Age-related rate			
For approx, age	Target value 1200 ppm	Target value 1000 ppm	Target group
0-6	19 m³/h	25 m³/h	Kindergarten
6-10	19 m³/h	25 m³/h	Primary school
10-14	23 m³/h	30 m³/h	Secondary school
14-19	24 m³/h	33 m³/h	Technical college
Over 19	25 m³/h	34 m³/h	University
Teacher	28 m³/h	37 m³/h	

Indoor sound pressure requirements in compliance with **DIN EN 15251** and **DIN EN 13779**:

Type of building/room	Sound pressure recommedned range (dBA)
Open-plan office	35-45
Conference room	30-40
Classroom, kindergarten	35-45
Cafeterias/restaurants	35-50
Retail outlets	35-50

Calculation example:

Ventilation calculation for a school class. The class includes 20 children from 10 to 14 years and one teacher. The set CO_2 concentration is 1000 ppm.

20 schoolchildren x 30 m³/h = 600 m³/h
1 teacher x 37 m³/h = 37 m³/h

required fresh air flow = 637 m³/h

Blauberg Ventilatoren GmbH
Aidenbachstr. 52
D-81379 Munich

info@blaubergventilatoren.de
www.blaubergventilatoren.de

02/2018