VR 400/700 DCV/DC

Good ventilation

For dwellings, smaller offices and business premises

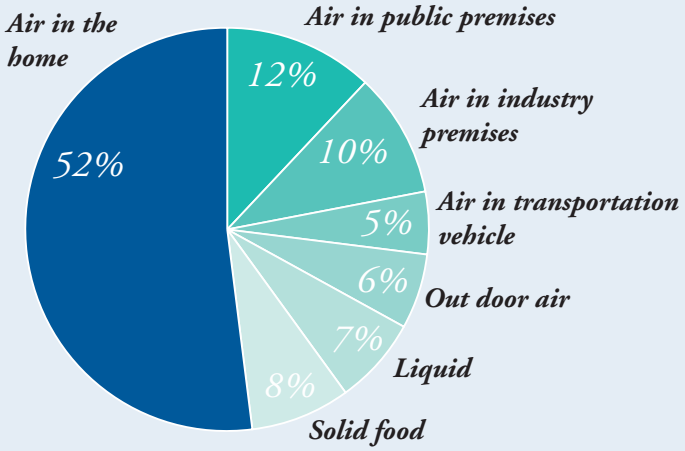
Systemair

Ventilation has one main aim. It should take away the consumed air that contains all the pollution generated in a building and replace the contaminated air with fresh clean air. The demand we put on the ventilation is that it shall function regardless of weather and wind, it shall not use more energy than necessary, meaning, it should be energy efficient and economical to run.

Energy efficiency and good indoor air – both are necessities!

Our indoor air

Recent years research shows that we are less productive when we breathe poor quality indoor air. In general we spend up to 70% of our time indoors and in colder climates such as some parts of Northern Europe this can be as much as 90%. It goes without saying that the approximately 15 000 litres of indoor air that we breathe in daily should be fresh and oxygen rich but is this the case today? Yes, our offices as a rule have good ventilation, but it is in our homes where we often have problems. If we want good indoor air, we must have good ventilation, there are no short cuts.



Breakdown of what we consume

Pollution in the air

All air is polluted to some extent. Normally we think about car exhaust gases, pollen and various other types of emissions when we think about these things. This type of pollution is always present in the out-door environment and transfers into our homes with the air. In the home there are other sources of pollution, such as furniture, electrical equipment, pets and of course, people. So, untreated air coming into our home is already polluted and after it has entered the building the pollution gradually grows worse. Due to the fact that our homes are normally well insulated and draught proof the air tends to linger. Well insulated houses with good draught proofing but without good ventilation often have the poorest air quality.

Asthma and allergies

Good air not only means increased well-being, it also means that we are able to perform better. We work better and for longer. For children, good air is even more important, it helps lessen the risk of suffering from asthma and allergies, conditions which are acquired at an early age and which according to many researchers are often the result of the indoor environment.

New demands on energy efficiency

The Swedish Government has introduced revisions in Ordinance10§ BVF for new buildings with electrical heating. Thereafter, the Building Regulations, BBR, Section 9:2 Energy Management will introduce more stringent demands on the specific energy consumption (kWh per m^2 per year)

of the building, and also limit the installed electric power in single houses with direct electrical heating as the main source of heating. The new regulations on energy management put great requirements on the design and workmanship. Ventilation, insulation and so on must be adapted to the lower energy use.

A ventilation system that does not meet these demands or is poorly designed will not be helped by modern construction methods and could indeed contribute to poor air quality in the home.

Well insulated houses can suffer with mould growth within the fabric of the building if there is damp due to leakage caused by positive pressure in the house. This puts great demands on the materials selected and requires a good balanced ventilation with heat recovery to help prevent the problem.

The solution is to build a well insulated house and to install water, rock or ground-source heat pump, combination boiler or district heating together with a ventilation unit with highly efficient heat recovery properties. This will result in both good energy management and good quality indoor air.

Good indoor environment should not cost a fortune

In order for us to feel all right we need a good ventilation system capable of furnishing the premises with air at the right temperature and quality. The system must do its job day in and day out for many years to come without creating discomfort such as noise or draught. And it should carry out this function at a reasonable cost.

The Swedish National Board of Housing, Building and Planning recommends that the SFP-value (Specific Fan Power) for a ventilation system (extract and supply air with heat recovery) should not exceed 2.0 kW/(m³/s). One should strive for solutions taking the environment into consideration by being energy efficient. It is not enough that they have a good heat recovery of the energy in the extract air. They should also be designed to create low pressure drop of their own and have fans equipped with the latest motor technology, using down to half as much energy as traditional motors.

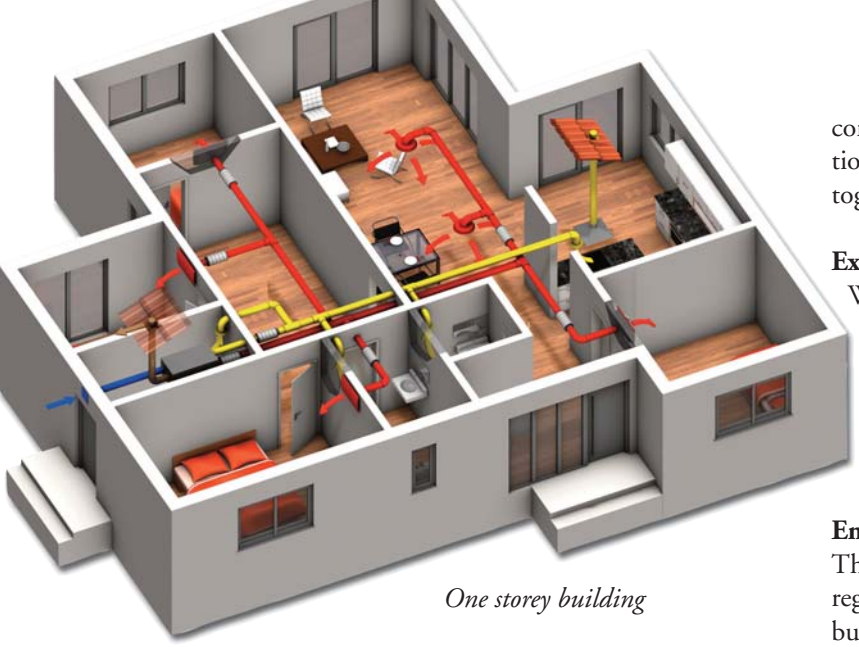
Quick selection

The table below shows Systemair's complete range of heat recovery units for homes and smaller premises. For further information regarding other products than VR DC we refer to separate documentation.

				Mounting				
				Warm			Cold	
Type	Residential area, m²	Heat exchanger	Efficiency, η	Wall	Floor	Above ceiling	Attic	Possible to connect to cooker hood
VR 250 EH/B	60	Rotating	80	X	–	X	–	X
VR 300 TK/B	100	Rotating	80	X	–	X	–	X
VR 400 EV/B	160	Rotating	80	X	–	–	–	X
VR 700 EV	300	Rotating	80	X	–	–	–	–
VR 400 DCV/B*	**180**	**Rotating**	**80**	**X**	**–**	**–**	**–**	**X**
VR 700 DCV*	**290**	**Rotating**	**80**	**X**	**–**	**–**	**–**	**–**
VR 400 E	160	Rotating	80	–	X	–	X	–
VR 700 E	320	Rotating	80	–	X	–	X	–
VR 400 DC*	**210**	**Rotating**	**80**	**–**	**X**	**–**	**X**	**–**
VR 700 DC*	**320**	**Rotating**	**80**	**–**	**X**	**–**	**X**	**–**
VM1	130	Counter flow	90	X	–	–	–	–
VM2	200	Counter flow	90	X	–	–	–	–
VX 250 TV/P	140	Cross flow	60	X	–	–	–	–
VX 400 EV	160	Cross flow	60	X	–	–	–	–
VX 700 EV	300	Cross flow	60	X	–	–	–	–
VX 400 E	160	Cross flow	60	–	X	–	X**	–
VX 700 E	300	Cross flow	60	–	X	–	X**	–

** Equipped with energy efficient EC fans*

*** Important that the water lock and drain pipe are frost protected with insulation*



One storey building

Solutions

Home

The VR 400/700 DC can be installed on a wall or in loft spaces. The picture shows a typical installation in a laundry room, but the location could just as well have been in the garage or in the basement. In the kitchen a separate kitchen extract fan with its own duct to roof cowl is installed.

Small premises

In smaller premises up to approx. 100 m^2, such as offices and shops, the VR 400/700 DC are suitable for installation in loft space if available or on a wall.

Control functions

The new control system has a very user-friendly interface that makes it easy to commission and use the unit. It also makes it possible to adapt VR 400/700 DC for several additional functions with connected components, e.g. for demand control. The controller is prepared to handle external cooling quipment (0...10V signal) but due to relative small airflows and with that limited refrigerating capacity we recomend to use the cooling function in commercial applications where higher airflows can be accepted and then also together with VR 700 DC/DCV units.

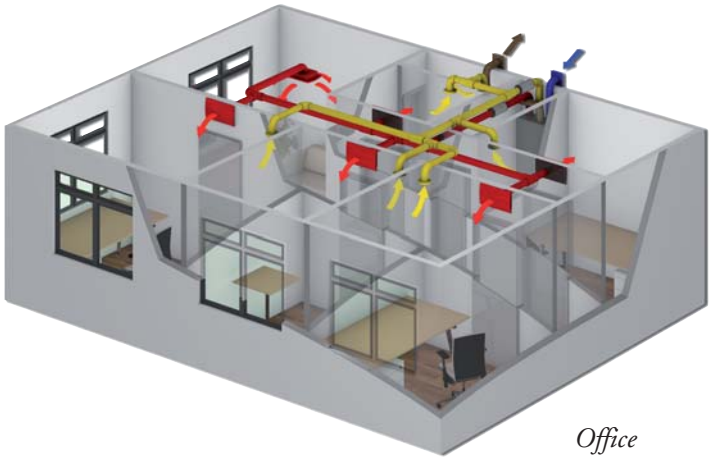
Examples of integrated control functions:

Weekly program
Alarm output
Possibility to control supply and extract air individually
Possibility to disconnect electrical heating
Separate control of hot water coil
Function for extended running

Energy effective fans with long service life

The VR 400/700 DC have fans with the latest technology regarding energy management. EC-motors are, within building ventilation, a new type of motor with a series of advantages compared to conventional AC-motors. They can be controlled without the occurrence of large energy losses in the form of heat. Another bonus effect is that there is no zing that occurs when controlling asynchronous motors.

Due to the lack of the unintentional heating, the need for maintenance is reduced and the service life of the motor is increased.

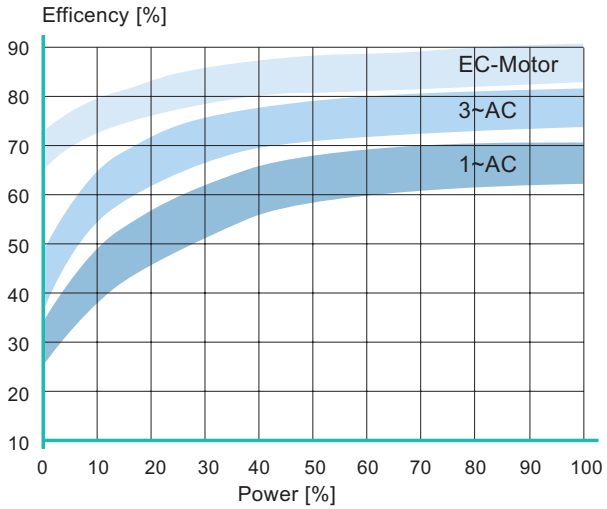


Office

Advantages with EC-motors:

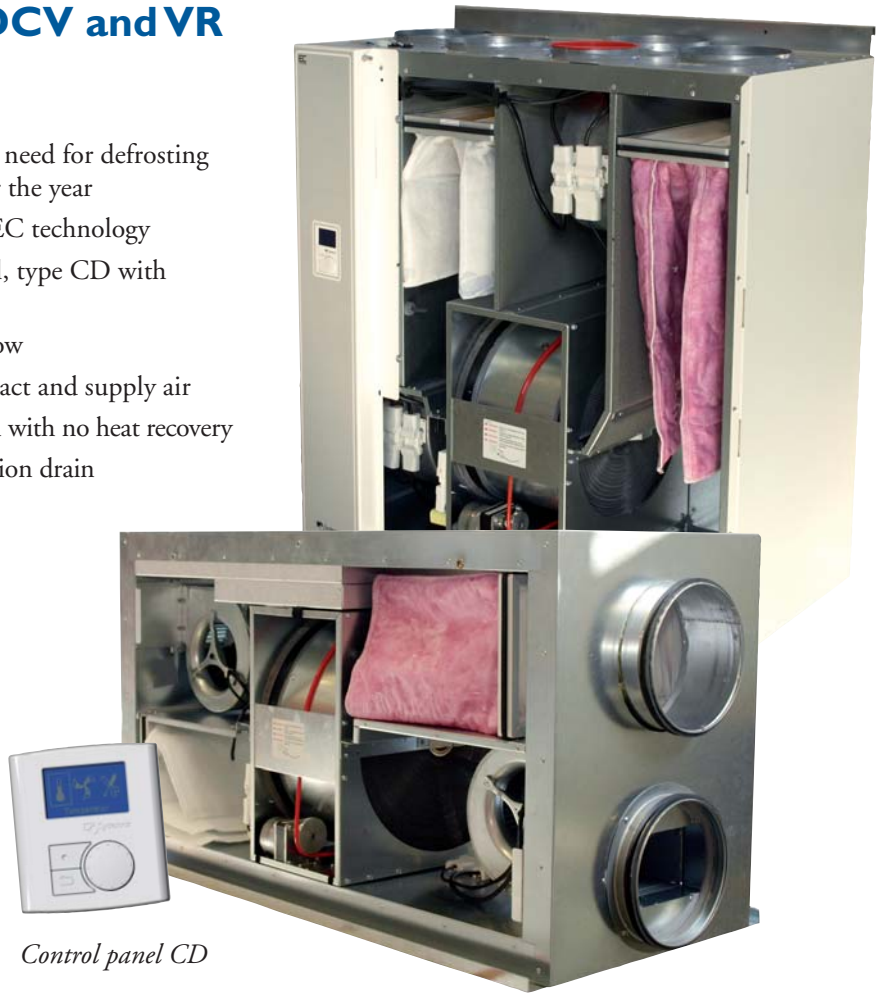
- Maintained efficiency throughout the motor speed range and low power losses means reduced operating cost
- Low heat losses and thereby lower risk of overheating
- Easy to control, including by remote control
- All controlling and protection electronics are integrated into the motor, which eliminates the risk of connection errors
- Service life not affected by lowering the speed gives less need for maintenance
- Low sound level

Comparison between different motors



VR 400 DCV/B,VR 700 DCV and VR 400/700 DC

- High efficiency heat recovery unit without need for defrosting will give the highest average efficiency over the year
- Energy efficient fan motors with modern EC technology
- Operation from user friendly control panel, type CD with LCD-display
- Separate setting of supply and extract airflow
- Constant airflow and balance between extract and supply air
- Changes automatically to summer operation with no heat recovery
- Flexible installation. No need for condensation drain
- Suited for demand control



Control panel CD

VR 400/700 DCV and DC are complete air handling units suitable for homes, smaller offices and similar premises. With EC-fan motors and a new regulation system the energy use is optimized to be able to meet the new regulations on energy management. Compared to AC-motors EC-motors maintain efficiency throughout the motor speed range when speed controlled and are therefore suitable to use in demand controlled ventilation units. Measurements show that an EC-motor reduces the energy use with up to 50% compared to a traditional voltage controlled AC-motor.

To ensure optimal operation, the rotating heat exchanger, supply and extract air filter, supply and extract fans, all temperature sensors and the re-heater are monitored. In the event of any technical errors or filter alarms the message shows in clear text in the control panel display. The units also have a common alarm output to indicate alarm in other places. All electrical connections are made in the built-in connection box.

DCV(/B) units are designed for installation on wall, in laundry rooms, utility rooms or similar. With the white painted door and side panels the unit can easily be installed to blend in with the surroundings. Large inspection doors simplifies inspection and service. The VR 400 DCV/B has a by-pass function which allows the unit to be connected to a kitchen hood. The polluted air from the hood is led directly to the extract fan without coming in contact with the rotating heat exchanger.

The DC-units are designed for mounting horizontal on the wall. They are manufactured with 30 mm insulation and are therefore suitable to be installed in cold premises e.g. store rooms, attics or similar.

Control panel

The control panel is equipped with a graphic display and is easy to use. Two access levels are used – one for users and one for installers and service staff. In the user level symbols are used and in the service level the menu is in clear text.

The control panel has a design suitable for homes and offices. It is, as standard, connected with quick-connector but can also be connected to a built in 4-pole terminal.

For DCV-units the control panel is integrated on the front and for DC-units it is delivered as an external component (accessory). For both DCV and DC- units it is possible to connect one or several external control panels.

Energy saving functions
Rotary heat exchanger with up to 80% heat recovery. No need for defrosting, which means continuous recovery of heat from the warm extract air. Separate adjustment of supply and extract air means less need of regulating dampers and thus avoiding increases in system pressure.

Built-in week timer adapts the units operation to the buildings activities. For example, an office:

Monday-Friday 08.00-17.00	Normal ventilation
Remaining time (incl. Saturday and Sunday)	Min. ventilation

The cool recovery function is used in the summer in combination with an external cooling unit. When the extract air is colder than the supply air the rotating exchanger starts and recovers the cooler temperature from the extract air. The unit comes ready for controlling an external hot water coil (accessory) via 0...10V signal. Actuator, valve and anti-freeze protection sensors are available as accessories.

Demand control
The unit can, via inputs, be overridden to operation mode; stop, low speed or high speed. The inputs are activated via external contact such as CO_2-sensor, movement detector, humidity sensor, light switch or timer.

Away function
Through closure of external contact, operation mode low speed is activated, the electric reheater is cut off and the supply air temperature is controlled by the rotary heat exchanger. The reheater is reconnected if the supply air temperature falls below 15°C.

Electrical connections
- Connections to mains supply via approx. 1 m cable for earthed connection.
- 4-core for connection to control panel with quick connection (accessory).
- Branch-off device (accessory) for installation of several external control panels.

Accessories

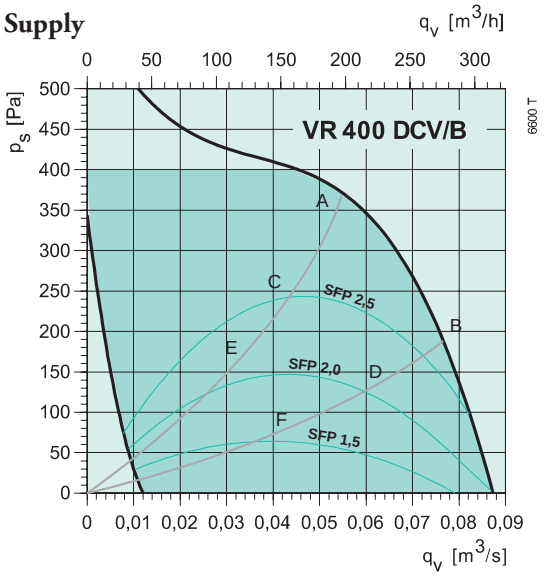
	VR 400 DCV/B	VR 700 DCV	VR 400 DC	VR 700 DC
Control panel	CD	CD	CD	CD
Cable w/plug 12m	CEC	CEC	CEC	CEC
Cable w/plug 6m	CEC	CEC	CEC	CEC
Diverging plug	CED	CED	CED	CED
Junction plug for cable	JP	JP	JP	JP
Timer	T 120	T 120	T 120	T 120
Timer frame	F-T120	F-T120	F-T120	F-T120
Cookerhood EV/B, EH/B white	251-10/B	-	-	-
Cookerhood EVB, EHB stainless steel	251-10/B	-	-	-
Valve actuctor 0.10V (24VDC)	MVT5	MVT5	MVT5	MVT5
Transformer (24VDC)	24V/PSS48	24V/PSS48	24V/PSS48	24V/PSS48
Water valve 2-way	VSXT	VSXT	VSXT	VSXT
Water valve 3-way	VMXT	VMXT	VMXT	VMXT
Water-heating battery	VBC	VBC	VBC	VBC
Frost protection sensor 0-30°C (HW coil)	TG-A130	TG-A130	TG-A130	TG-A130
Duct sensor 0-60°C	TG-K360	TG-K360	TG-K360	TG-K360
Filter EU7 (Supply air)	BFVR 400 EV	BFVR 700 EV	BFVR 400 E	BFVR 700 E
Filter EU3 (Extract air)	PFVR 400	PFVR 700	PFVR 400	PFVR 700
Combi grille	CVVX 160	CVVX 200	CVVX 160	CVVX 200
Damper, shut-off	EFD 160	EFD 200	EFD 160	EFD 200

Technical data

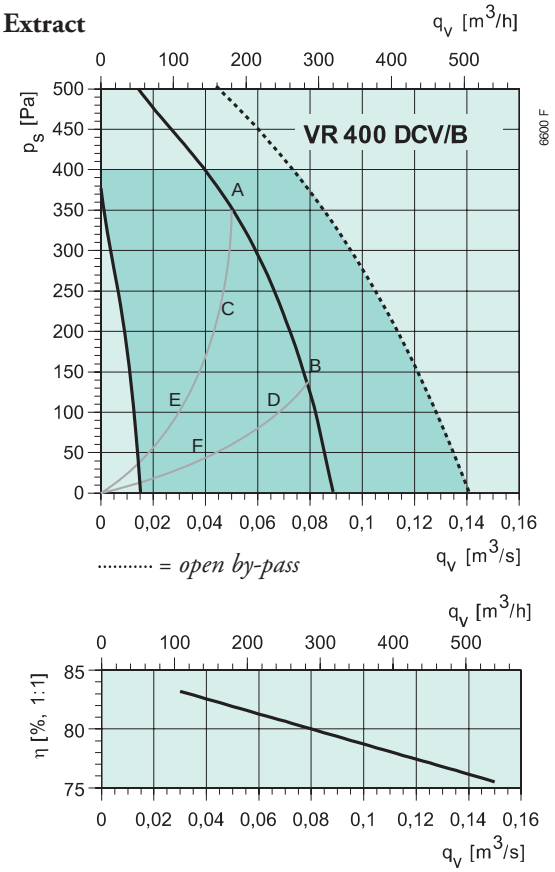
VR		400 DCV/B	700 DCV	400 DC	700DC
Voltage	V	230/240	230/240	230/240	230/240
Frequency	Hz	50	50	50	50
Phase	~	1	1	1	1
Powers, motors	W	2x114	2x240	2x115	2x246
Power, heating battery	W	1670	1670	1670	1670
Fuse	A	10	16	10	16
Weight	kg	59	72	59	72
Filter, supply air		EU7	EU7	EU7	EU7
Filter, extract air		EU3	EU3	EU3	EU3

Performance

Supply



Extract



Supply

	Mid-frequency band, Hz								
dB(A)	Tot	63	125	250	500	1k	2k	4k	8k
A	72	59	66	64	63	64	65	59	52
B	68	54	61	61	59	62	62	55	48
C	71	56	61	62	61	64	66	59	52
D	67	52	57	58	57	61	60	54	48
E	68	59	59	57	58	61	61	54	48
F	64	52	55	54	56	60	57	51	45

Extract

	Mid-frequency band, Hz								
dB(A)	Tot	63	125	250	500	1k	2k	4k	8k
A	64	52	60	56	55	51	51	46	45
B	62	51	58	57	54	49	47	42	33
C	52	41	48	44	46	41	34	26	14
D	57	44	54	50	49	45	39	33	28
E	58	47	56	48	49	44	40	34	22
F	62	50	60	53	52	47	44	39	30

Surrounding (Read in supply air diagram)

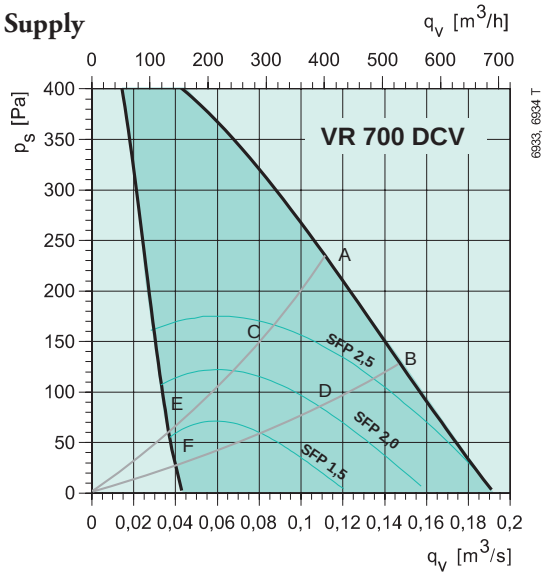
	Mid-frequency band, Hz								
dB(A)	Tot	63	125	250	500	1k	2k	4k	8k
A	54	36	46	45	43	45	47	45	44
B	50	32	42	43	41	43	44	41	35
C	50	33	41	41	40	42	45	42	38
D	46	28	37	37	36	39	39	37	33
E	49	36	42	39	39	42	42	39	34
F	45	28	37	35	37	39	38	35	31

Thermal efficiency
With air ratio 1:1 and air humidity at 50%

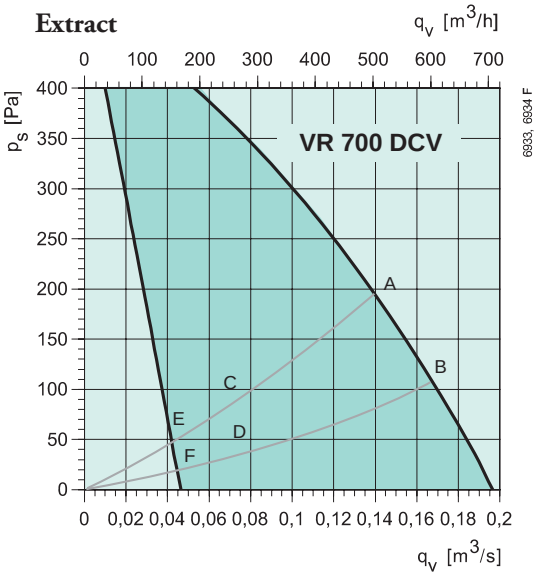
Sound data
The sound data tables indicate the sound power level L_{wA}, which should not be confused with the sound pressure level L_{pA}.

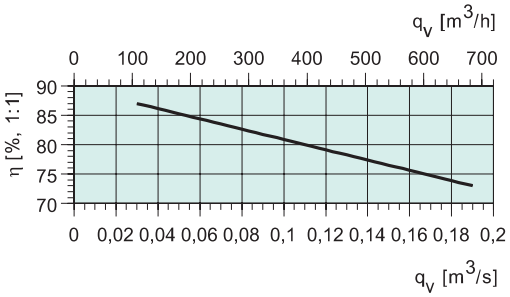
SFP= Specific Fan Power [kW/m³/s]
The SFP value stated applies to the complete unit.

Supply



Extract





Supply

Mid-frequency band, Hz

dB(A)	Tot	63	125	250	500	1k	2k	4k	8k
A	77	58	63	70	70	70	71	66	60
B	78	60	65	70	71	71	72	67	60
C	74	56	62	67	67	68	68	63	56
D	72	56	61	64	65	66	66	61	53
E	61	46	49	53	55	56	53	46	37
F	59	45	48	52	54	54	51	44	33

Extract

Mid-frequency band, Hz

dB(A)	Tot	63	125	250	500	1k	2k	4k	8k
A	65	49	52	63	58	50	48	41	36
B	64	47	51	62	58	50	48	41	36
C	56	40	43	53	50	42	36	28	15
D	53	38	41	51	47	40	34	26	14
E	48	30	36	45	42	35	27	18	20
F	45	30	32	42	40	33	23	17	20

Surrounding (Read in supply air diagram)

Mid-frequency band, Hz

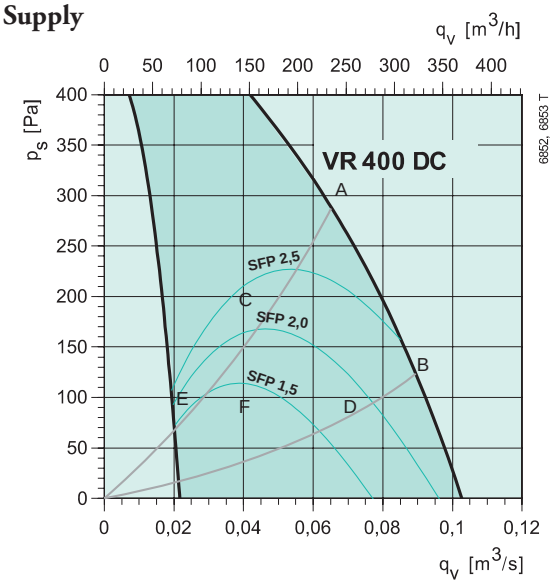
dB(A)	Tot	63	125	250	500	1k	2k	4k	8k
A	55	39	46	51	47	48	46	40	37
B	56	41	47	51	48	48	47	41	37
C	50	37	43	45	42	43	39	33	26
D	52	37	44	48	44	45	41	35	29
E	39	27	31	34	32	33	27	19	19
F	38	26	29	33	30	31	25	18	19

Thermal efficiency
With air ratio 1:1 and air humidity at 50%

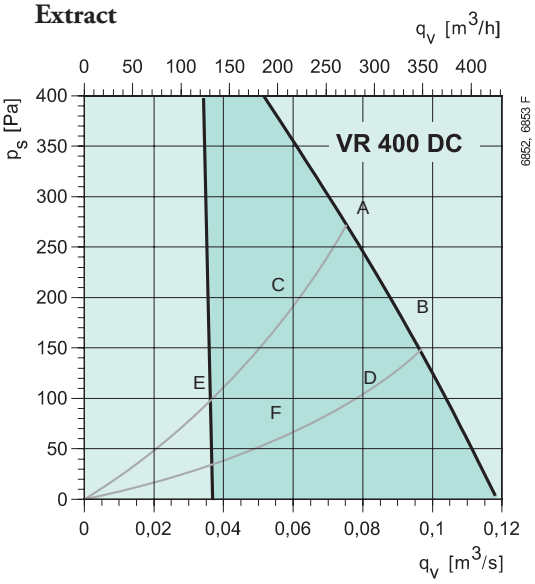
Sound data
The sound data tables indicate the sound power level L_{wA}, which should not be confused with the sound pressure level L_{pA}.

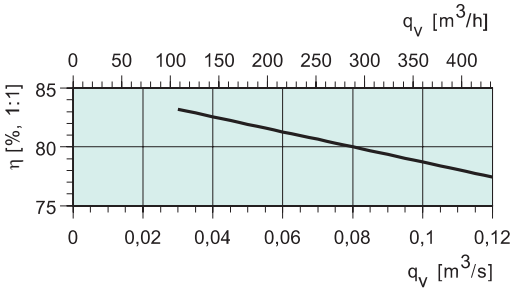
SFP= Specific Fan Power [kW/m³/s]
The SFP value stated applies to the complete unit.

Supply



Extract





Supply

	Mid-frequency band, Hz								
dB(A)	Tot	63	125	250	500	1k	2k	4k	8k
A	73	58	67	65	64	65	67	59	54
B	74	57	66	68	67	67	67	60	54
C	67	56	60	58	57	61	60	53	46
D	69	55	62	62	61	63	61	54	48
E	56	45	50	48	49	50	48	41	31
F	62	48	55	53	53	56	53	46	39

Extract

	Mid-frequency band, Hz								
dB(A)	Tot	63	125	250	500	1k	2k	4k	8k
A	63	38	59	58	54	53	53	46	37
B	63	39	60	59	55	48	47	41	31
C	60	35	56	54	51	49	50	43	34
D	62	39	58	57	53	48	46	40	31
E	52	37	49	44	44	41	40	34	24
F	53	35	50	46	44	41	37	30	21

Surrounding (Read in supply air diagram)

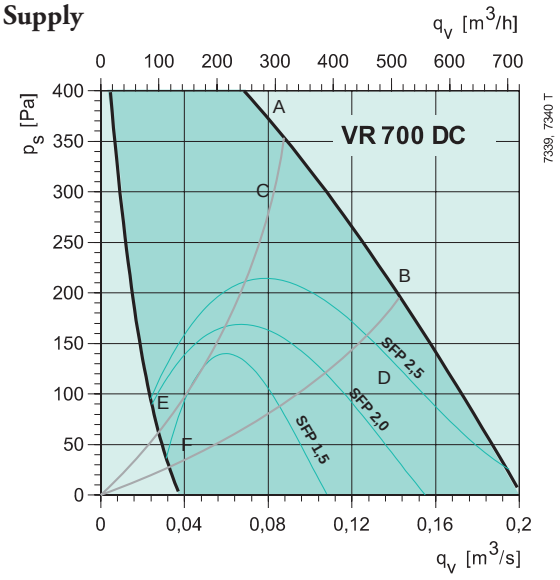
	Mid-frequency band, Hz								
dB(A)	Tot	63	125	250	500	1k	2k	4k	8k
A	58	30	45	51	47	52	53	45	37
B	56	29	45	52	49	46	47	41	32
C	46	27	38	40	38	39	38	31	24
D	54	27	42	50	47	46	47	39	30
E	45	16	29	38	37	39	40	32	24
F	54	21	36	47	43	47	49	41	33

Thermal efficiency
With air ratio 1:1 and air humidity at 50%

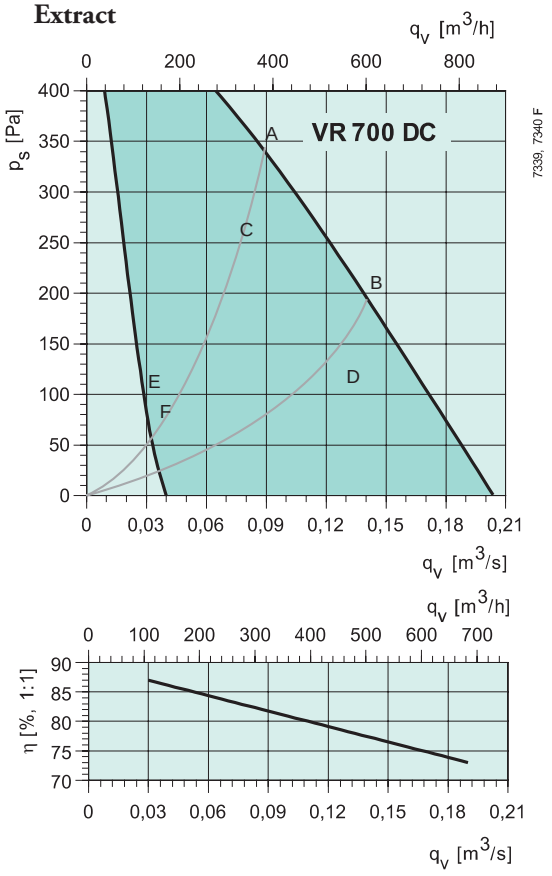
Sound data
The sound data tables indicate the sound power level L_{wA}, which should not be confused with the sound pressure level L_{pA}.

SFP= Specific Fan Power [kW/m³/s]
The SFP value stated applies to the complete unit.

Supply



Extract



Supply

		Mid-frequency band, Hz							
dB(A)	Tot	63	125	250	500	1k	2k	4k	8k
A	80	64	71	71	73	73	73	70	64
B	80	62	71	71	73	74	73	70	65
C	79	64	70	70	72	72	72	68	63
D	79	61	68	70	72	73	72	68	63
E	64	49	55	55	57	59	56	51	41
F	60	45	51	51	54	56	51	46	34

Extract

		Mid-frequency band, Hz							
dB(A)	Tot	63	125	250	500	1k	2k	4k	8k
A	70	48	57	65	67	56	54	48	38
B	69	49	56	64	66	56	54	48	38
C	58	34	45	53	55	45	43	36	24
D	62	45	50	57	59	49	47	41	30
E	51	33	38	47	48	39	36	28	20
F	48	35	34	42	45	35	31	22	18

Surrounding (Read in supply air diagram)

		Mid-frequency band, Hz							
dB(A)	Tot	63	125	250	500	1k	2k	4k	8k
A	59	39	51	50	55	51	50	46	44
B	59	38	50	50	55	51	50	46	44
C	58	39	50	50	54	50	49	44	43
D	58	37	48	49	53	50	49	44	43
E	46	24	36	38	42	39	37	29	23
F	51	33	44	41	45	42	42	38	35

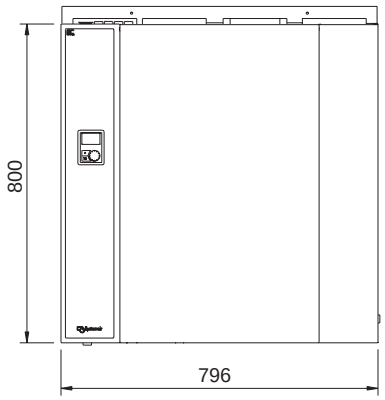
Thermal efficiency
With air ratio 1:1 and air humidity at 50%

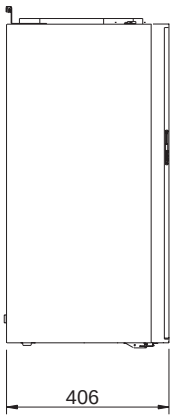
Sound data
The sound data tables indicate the sound power level L_{wA}, which should not be confused with the sound pressure level L_{pA}.

SFP= Specific Fan Power [kW/m³/s]
The SFP value stated applies to the complete unit.

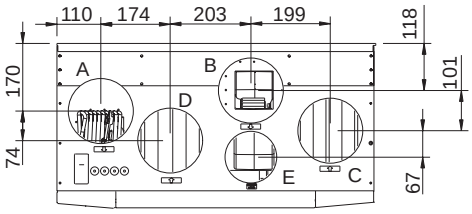
Dimensions

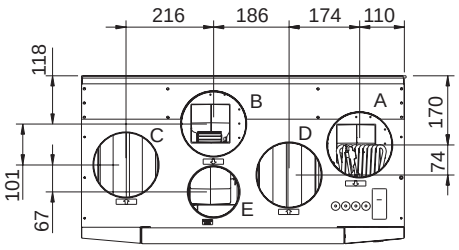
VR 400 DCV/B





Left hand version

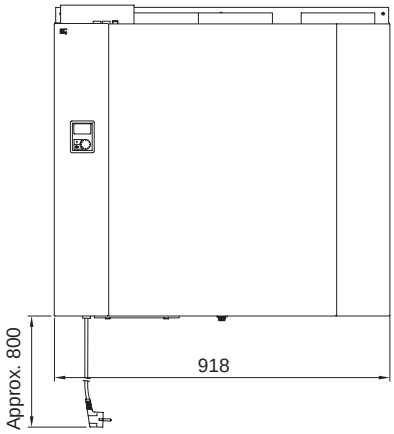


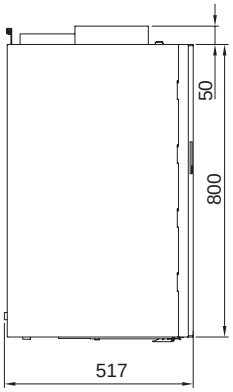


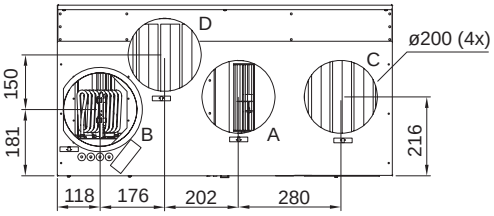
Right hand version

A Supply air ø160 mm
B Exhaust air ø160 mm
C Fresh air ø160 mm
D Extract air sanitary room/kitchen ø160 mm
E Extract air cooker hood ø125 mm

VR 700 DCV

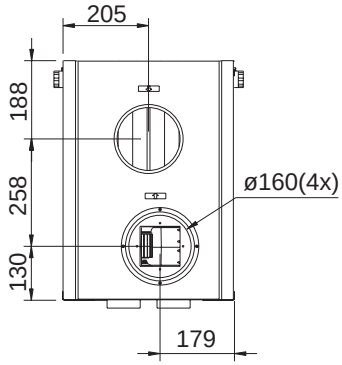


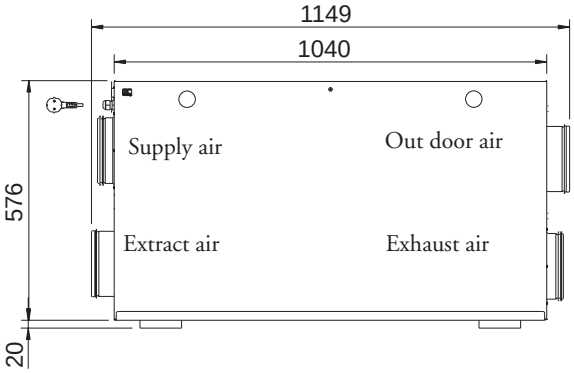


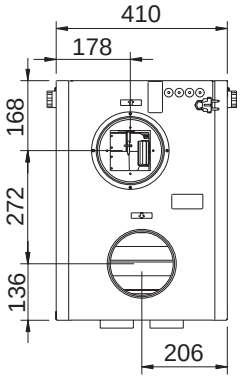


A Exhaust air
B Supply air
C Fresh air
D Extract air

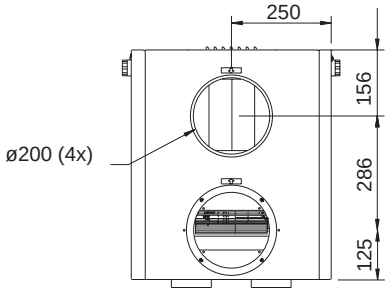
VR 400 DC

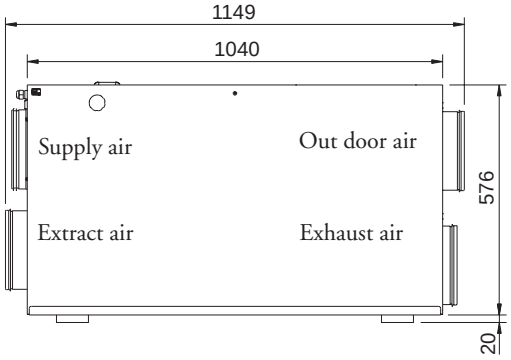


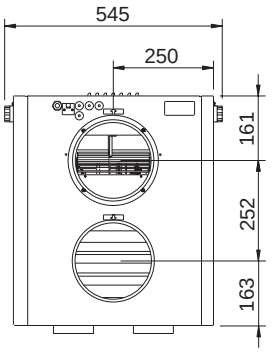




VR 700 DC







Systemair AB • SE-739 30 Skinnskatteberg, Sweden
Tel +46 222 440 00 • Fax +46 222 440 99

Systemair 2008 • Inhouse studio • Art no E8070