



Technical documentation

Compact comfort ventilation unit

CKL for internal installation • CKL as weatherproof version



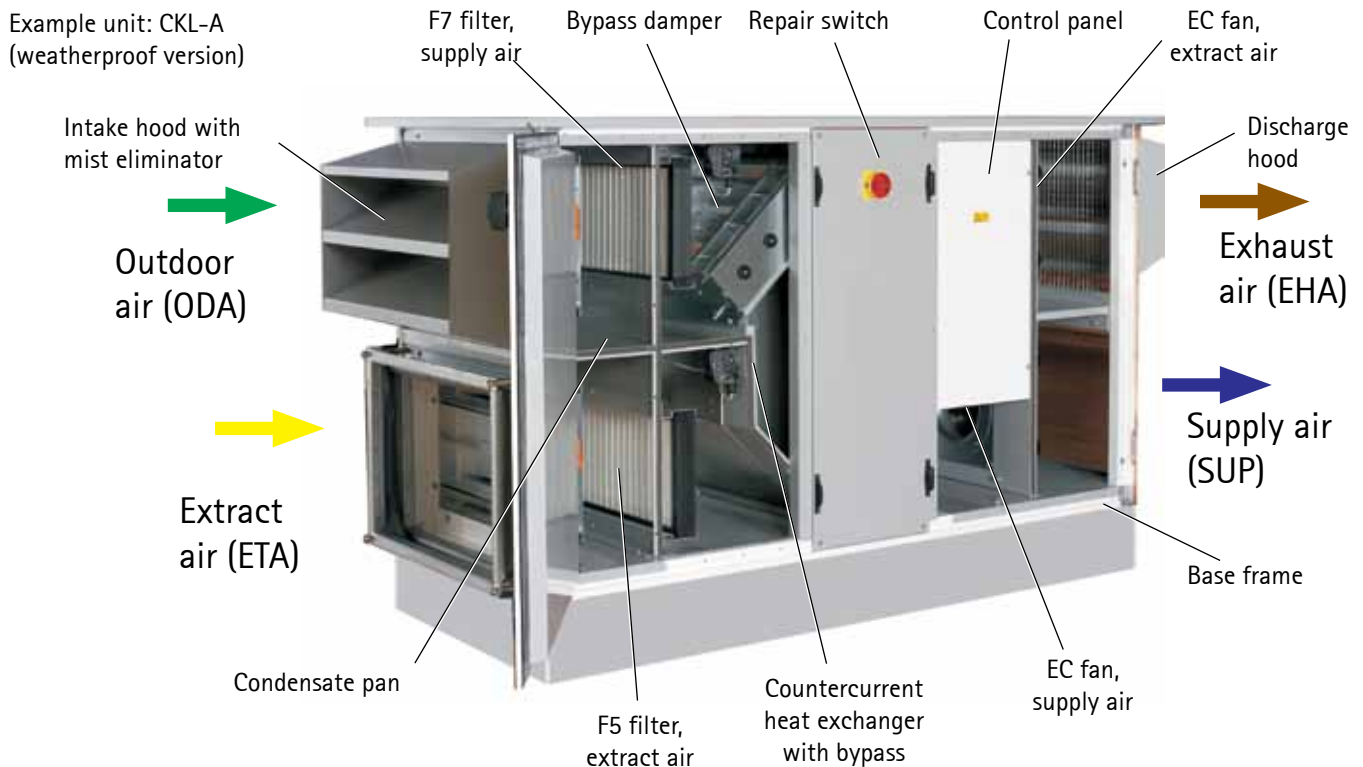
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Comfort compact ventilation unit CKL

Applications

Compact units with heat recovery are designed for controlled ventilation in modern properties. The regulations for energy saving and air hygiene in buildings have led to an increase in the technical and hygienic requirements of ventilation systems. CKL compact units with heat recovery provide rooms with filtered outdoor air, the volume of which can be adjusted to ensure sufficient supply. At the same time, a corresponding volume of used room air containing CO₂ is removed and exhausted. This results in other pollutants such as odours, fine dust, moisture etc. being removed effectively as well. Heat is recovered via an aluminium countercurrent plate heat exchanger (PHE) with efficiency levels up to and exceeding 90%. In this way, the primary energy costs of the heating system can be significantly reduced. The high energy efficiency also explains the favourable SFP value (specific fan power).



- Combined supply and extract air ventilation unit in a compact design with integrated heat recovery thanks to high performance countercurrent plate heat exchanger made from corrosion-resistant aluminium alloy
- Compact unit dimensions (see "scope of supply"), internal and external units up to 5800 m³/h. CKL-iH-4400, 5800 and CKL-iV-4400, 5800 may be split to ease bringing-in procedure.
- Fully wired unit for quick, uncomplicated commissioning
- Unit ON/OFF switch for maximum safety during maintenance and repairs
- Control panel for control elements integrated in/on the unit
- Programming unit can also be used as a remote control
- Free-running fan wheels, variable speed due to EC technology, IE3 efficiency class
- Optional heater can be integrated
- Option of cooling coil as downstream heat exchanger
- Stainless steel condensate pans EHA/SUP

Motor data	CKL-1300	CKL-2200	CKL-3000	CKL-4400	CKL-5800
Rated voltage (Frequency)	1x230 V (50/60 Hz)	3x400 V (50/60 Hz)	3x400 V (50/60 Hz)	3x400 V (50/60 Hz)	3x400 V (50/60 Hz)
Max. power consumption / Max. current consumption of both fans	0,96 kW / 4,2 A	2,0 kW / 3,2 A	2,0 kW / 3,3 A	6,0 kW / 9,2A	6,0 kW / 9,2A
Speed	2970 rpm	3100 rpm	2580 rpm	2550 rpm	2550 rpm
IP rating / Protection class	IP54 / Iso B	IP54 / Iso B	IP54 / Iso B	IP 54 / Iso F	IP 54 / Iso F

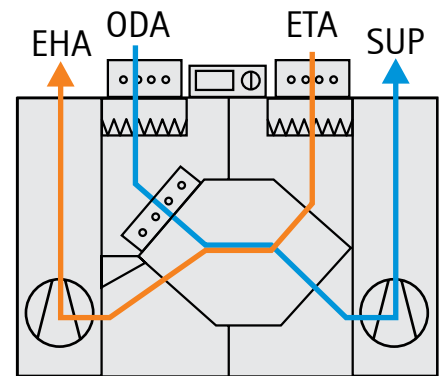
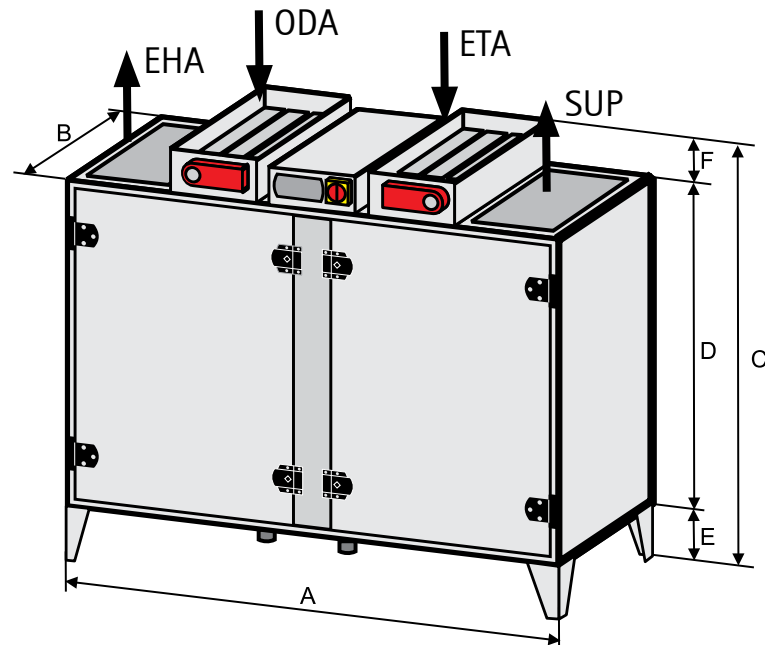
Technical data Internal unit CKL-iV

CKL-iV

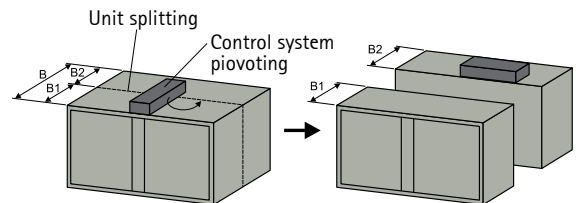
Internal unit with vertical duct connection

SUP right with mounting parts

SUP left = mirror image



CKL-iV-4400 / CKL-iV-5800 Split version



Typ		CKL-iV-1300	CKL-iV-2200	CKL-iV-3000	CKL-iV-4400		CKL-iV-5800	
Length A	mm	1525	2033	2033	2237		2237	
Width B	mm	750	750	950	1360		1665	
		-	-	-	B1=645	B2=715	B1=950	B2=715
Total height C	mm	1315	1720	1720	1745		1745	
Height D	mm	1017	1425	1425	1425		1425	
Foot height E	mm	170	170	170	170		170	
Damper height F	mm	128	128	128	150		150	
Exhaust Air EHA	mm	Li 596x206*	Li 596x307*	Li 799x307*	Li 1222x358*		Li 1527x358*	
Outdoor air ODA	mm	Li 596x206*	Li 596x307*	Li 799x307*	Li 1222x358*		Li 1527x358*	
Extract air ETA	mm	Li 596x206*	Li 596x307*	Li 799x307*	Li 1222x358*		Li 1527x358*	
Supply air SUP	mm	Li 596x206*	Li 596x307*	Li 799x307*	Li 1222x358*		Li 1527x358*	
Condens. connec.		1 1/2 "	1 1/2 "	1 1/2 "	1 1/2 "		1 1/2 "	
Weight	kg	250	360	450	645		725	
Max. flow rate	m ³ /h	1300	2200	3000	4400		5800	

* Duct connection dimensions

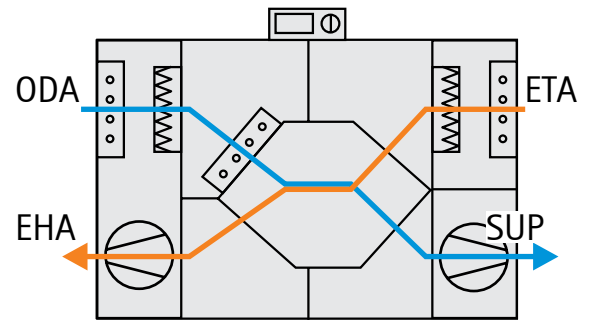
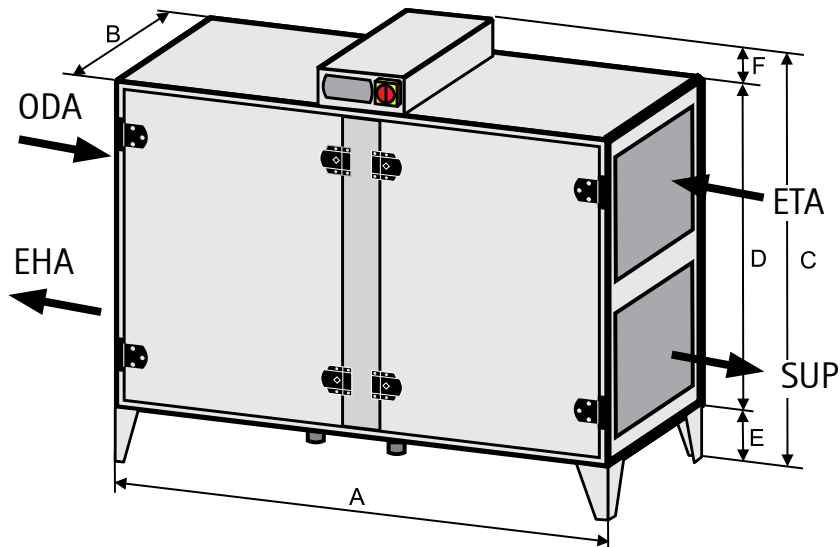
Technical data Internal unit CKL-iH

CKL-iH

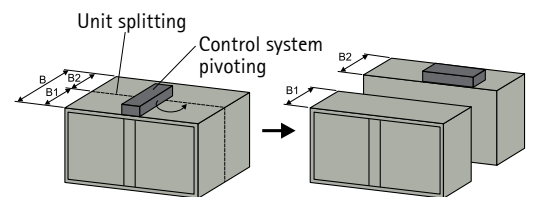
Internal unit with horizontal duct connection

SUP right with mounting parts

SUP left = mirror image



CKL-iH-4400 / CKL-iH-5800 Split version



Typ		CKL-iH-1300	CKL-iH-2200	CKL-iH-3000	CKL-iH-4400		CKL-iH-5800	
Length A	mm	1525	2033	2033	2237		2237	
Width B	mm	750	750	950	1360		1665	
		-	-	-	B1=645	B2=715	B1=950	B2=715
Total height C	mm	1305	1711	1711	1711		1711	
Height D	mm	1017	1425	1425	1425		1425	
Foot height E	mm	170	170	170	170		170	
Damper height F	mm	118	118	118	118		118	
Exhaust Air EHA	mm	Li 612x409*	Li 612x612*	Li 815x612*	Li 1222x612*		Li 1527x612*	
Outdoor air ODA	mm	Li 612x409*	Li 612x612*	Li 815x612*	Li 1222x612*		Li 1527x612*	
Extract air ETA	mm	Li 612x409*	Li 612x612*	Li 815x612*	Li 1222x612*		Li 1527x612*	
Supply air SUP	mm	Li 612x409*	Li 612x612*	Li 815x612*	Li 1222x612*		Li 1527x612*	
Condens. connec.		1 ½ "	1 ½ "	1 ½ "	1 ½ "		1 ½ "	
Weight	kg	250	360	450	630		725	
Max. flow rate	m³/h	1300	2200	3000	4400		5800	

* Duct connection dimensions

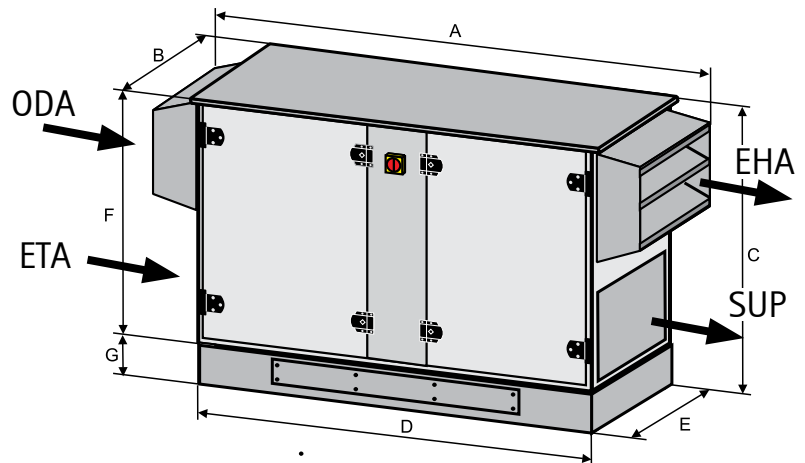
Technical data External unit (weatherproof) CKL-A

CKL-A

External unit (weatherproof)

SUP right with mounting parts

SUP left = mirror image



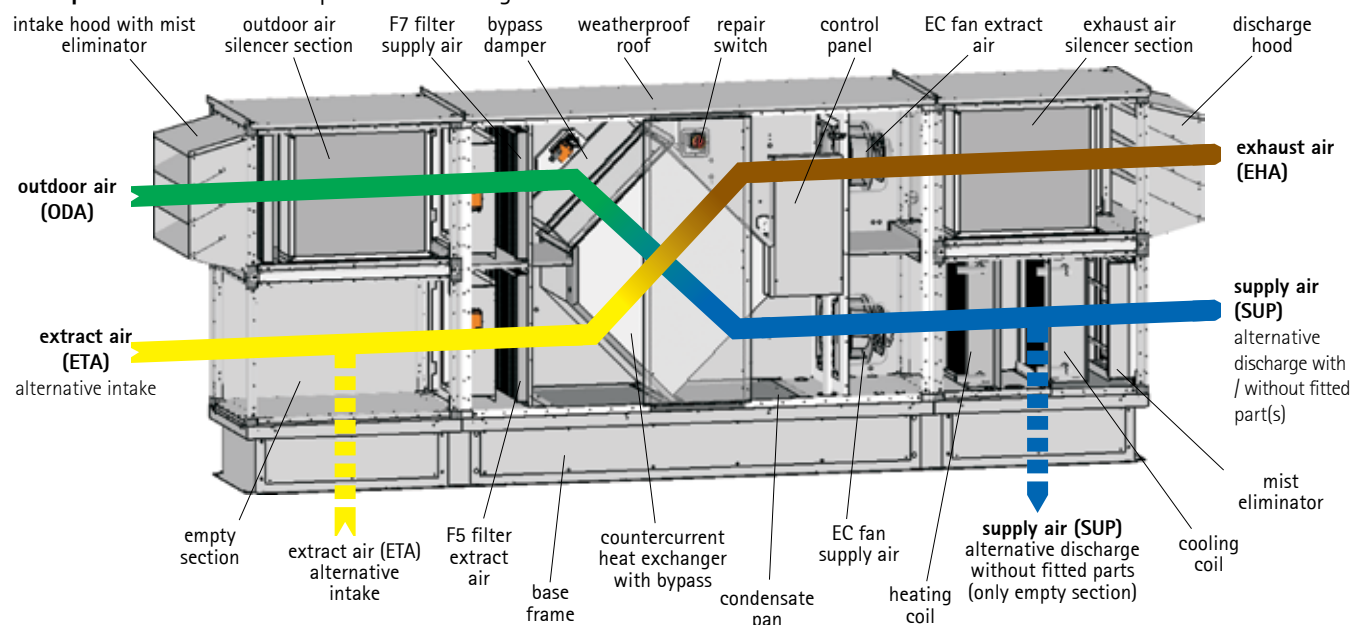
Type		CKL-A-1300	CKL-A-2200	CKL-A-3000	CKL-A-4400	CKL-A-5800
Total length A	mm	2111	2780	2780	2780	2780
Total width B	mm	812	812	1015	1422	1725
Total height C	mm	1350	1750	1750	1750	1750
Length D	mm	1729	2236	2236	2236	2236
Width E	mm	712	712	915	1322	1625
Height F	mm	1050	1450	1450	1450	1450
Base frame G	mm	300	300	300	300	300
Extract air ETA	mm	Li 612x409*	Li 612x612*	Li 815x612*	Li 1222x612*	Li 1525x612*
Supply air SUP	mm	Li 612x409*	Li 612x612*	Li 815x612*	Li 1222x612*	Li 1525x612*
Condens. connection		1 1/2 "	1 1/2 "	1 1/2 "	1 1/2 "	1 1/2 "
Weight	kg	315	460	555	715	800
Max. flow rate	m³/h	1300	2200	3000	4400	5800

* Duct connection dimensions

CKL-A

External unit, weatherproof, with optional duct connection horizontal / vertical depending on unit version and installation situation. Depending on different thermodynamical (heating, cooling) and acoustical (sound) requirements, our self-developed design program offers the opportunity of an individual configuration (technical data, delivery time and price on request).

Example: Maximum view of possible unit design versions



Note: Extract air intake and supply air outlet can be arranged as required, horizontally or vertically. Please note that a horizontal arrangement of the supply air outlet is only possible when there are fitted parts like heating or cooling coil and mist eliminator downstream the supply air fan.

To direct the supply air outlet downwards (despite fitted parts), a supplementary empty section can be added.

CKL component description

Housing



Compact, stable housing.

Internal unit with feet as standard (height adjustable up to 30 mm).

External unit with all-round base frame as standard (height 300 mm).

Duplex casing structure made of powder-coated sheet steel, RAL 9016 (commercial white) with core of 50 mm thick thermal insulation, intermediate panel, silver, RAL 9006. Optimum sound and thermal insulation through mineral wool, building material category A1, non-combustible to DIN 4102.

Inspection doors extending across the entire operating height of the unit ensure excellent access to fitted parts.

Motor/fan unit for supply and extract air



Highly efficient free-running fans, single sided intake, directly connected to EC motor with low energy consumption, infinitely variable (0 – 10 V).

Complete motor/fan unit statically and dynamically balanced.

Fan/motor combination with very low noise levels.

Heat recovery



Heat recovery by means of high performance countercurrent plate heat exchanger (PHE).

Heat exchanger made from high grade, corrosion-resistant aluminium.

Very low air resistance.

Heat recovery factors up to and exceeding 90%.

Bypass



A bypass is built into the air supply side of the unit as standard.

Consequently, the bypass is able to take full care of night time ventilation during the summer.

Filters



Easy-to-replace compact panel filter.

Supply air filter: class F7 (fine dust filter and pollen filter).

Extract air filter: class F5 (fine dust filter).

Control unit

Control unit



The microprocessor-controlled control unit, with an isolator on the appliance, is fully assembled and wired at the factory. It controls and regulates the fans, heat recovery, temperatures, flow rates and operating times, as well as a variety of internal functions and alarms.

Function	Description
Languages	Language selection with menu prompts
Preheat program	When outside temperatures are low (adjustable setting), the heating circuit will heat up first when the system is started up. This ensures that when there is a risk of frost the heater bank is not damaged and cold air is not blown in
Backup mode, heating and cooling	In off mode; minimum and maximum room temperature limits are maintained (unoccupied period)
Night ventilation / cooling function	The building can be cooled to an adjustable set value during the night using cooler outdoor air (unoccupied period)
Burner demand via contact	Heat demand to Wolf boilers is issued via the floating contact
Summer compensation	As outside temperatures rise, the set value tracks the room temperature
Natural cooling	If a room needs to be cooled and cool outdoor air is available, outdoor air will first be used for cooling; if the supply of outdoor air is insufficient, the cooling bank will be operated
Fault logging	Date and time of fault are recorded (10 messages)
Anti-seizing pump protection	To stop the pumps seizing up, they are run once a week (service function, adjustable start time)
Anti-seizing mixer protection	To stop the mixers seizing up, they are run once a week (service function, adjustable start time)
CO ₂ or VOC control	The speed is matched as appropriate via the CO ₂ content of the air
Constant pressure control	Constant pressure control in extract or supply air duct, differential pressure sensor mounted in the unit
Flow rate control	For controlling a constant air volume, differential pressure sensor mounted in the unit
Time programme per day	Setting of 4 daily programmes with 5 switching times each, for different set-points of temperature, speed, pressure
Switching times per day	5 start times and 5 stop times can be set
Filter monitor (contamination check)	Weekly (adjustable start time, service function), checks the barometric cells for extract and supply air
Fire alarm connection	When fire alarm devices are triggered, the system shuts down (adjustable)
Thermal motor monitor	Motor monitoring via positor
Outdoor / exhaust air damper switching	230 V OPEN/CLOSED switching by controller
Outside temperature sensor	Outside sensor for direct connection to controller (always required)
Supply air temperature control	Supply air is controlled according to the set value
Supply air – indoor air control	Room temperature control via room sensor
Supply air – extract air control	Room temperature control via extract air sensor
Floating central fault message contact	All accumulating faults are transferred via this contact
Infinitely variable valve control, cooling / heat	Control of valve drives with 0 – 10 V DC
Constant operation for heating circuit pump	For uninsulated / long pipework
External system start	Remote On / Off
Operating modes	Automatic mode, manual mode, off mode (unoccupied period), standby (off)
Infinitely variable motor control	Balance adjustment option for fans (extract air management)
HR, cooling via HR (heat recovery)	PHE (bypass damper control), each with 0 – 10 V DC switching
Electric heater bank	Control of an electric heater bank, stepless 0 – 10 V DC switching
Frost protection, heater bank (PWW)	Frost stat on bank; when triggered, the valve turns off, the bank is purged
Holiday program	Additional time program for the aforementioned operating modes
Summer / winter changeover	Automatically in relation to date
PHE de-icing function (ice guard sensor on plate heat exchanger)	When there is a risk of icing-up, the bypass damper is opened and the PHE is de-iced by the flow of warm extract air
Supply air minimum limit	For all control unit versions; the supply air temperature does not fall below an adjustable limit
Programming unit with FSTN graphics	The programming unit can also be used as a remote control, display, connections for BMS on controller

Accessories

Accessories (dependent on size)



Electric pre-heater bank; single stage for pre-drying filter

1000 W; 1x230V/50Hz for CKL-iV/iH/A-1300; plug-in

2000 W; 1x230V/50Hz for CKL-iV/iH/A-2200, 3000; plug-in

4000 W; 2x230V/50Hz for CKL-iV/iH/A-4400, 5800; plug-in



Electric booster heater bank to increase the supply air temperature

1000 W; 1x230V/50Hz for CKL-iV/iH/A-1300; plug-in

4000 W; 3x400V/50Hz for CKL-iV/iH/A-2200

6000 W; 3x400V/50Hz for CKL-iV/iH/A-3000



Heat exchanger LPHW (low pressure hot water)

CU-Al heat exchanger for supply air re-heating,

for CKL-iV/iH/A-1300; frost stat fully wired

for CKL-iV/iH/A-2200, 3000; frost stat fully wired

for CKL-iV/A-4400,5800; frost stat fully wired

(LPHW, frost stat fully wired, mixing valve and actuator supplied loose;

for CKL-iH-4400, 5800 HCDE extension module (Heating/Cooling coil, Drop Eliminator) required)



Siphon with non-return valve DN50; intake side, supplied loose (set = 2 pce)

for CKL-iV/iH/A-1300, 2200, 3000, 4400, 5800

(fitted as standard on CKL-iV/iH-4400, 5800)



Frost protection heating for siphon

for CKL-A



Insulating frame, length 140mm, 130mm from unit edge of CKL

CKL-iV-1300 (set = 4 pce)

596 x 205mm

CKL-iV-2200 (set = 4 pce)

596 x 307mm

CKL-iV-3000 (set = 4 pce)

799 x 307mm

CKL-A-1300 (set = 2 pce), CKL-iH-1300 (set = 4 pce)

612 x 409mm

CKL-A-2200 (set = 2 pce), CKL-iH-2200 (set = 4 pce)

612 x 612mm

CKL-A-3000 (set = 2 pce), CKL-iH-3000 (set = 4 pce)

815 x 612mm

CKL-A-4400 (set = 2 pce), CKL-iH-4400 (set = 4 pce)

1222 x 612mm

CKL-A-5800 (set = 2 pce), CKL-iH-5800 (set = 4 pce)

1525 x 612mm

CKL-iV-4400 (set = 4 pce)

1222 x 358mm

CKL-iV-5800 (set = 4 pce)

1527 x 358mm

Accessories



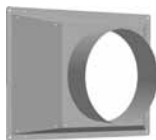
Flexible connection, length 130mm, 120mm from unit edge of CKL

CKL-iV-1300 (set = 4 pce)	592 x 201mm
CKL-iV-2200 (set = 4 pce)	592 x 303mm
CKL-iV-3000 (set = 4 pce)	795 x 303mm
CKL-A-1300 (set = 2 pce), CKL-iH-1300 (set = 4 pce)	608 x 405mm
CKL-A-2200 (set = 2 pce), CKL-iH-2200 (set = 4 pce)	608 x 608mm
CKL-A-3000 (set = 2 pce), CKL-iH-3000 (set = 4 pce)	811 x 608mm
CKL-A-4400 (set = 2 pce), CKL-iH-4400 (set = 4 pce)	1218 x 608mm
CKL-A-5800 (set = 2 pce), CKL-iH-5800 (set = 4 pce)	1521 x 608mm
CKL-iV-4400 (set = 4 pce)	1218x354mm
CKL-iV-5800 (set = 4 pce)	1523x354mm



Adaptor box rectangular to round for vertical air direction, height 310mm (set = 2 pce)

D = 315mm for CKL-iV-1300
D = 400mm for CKL-iV-2200
D = 450mm for CKL-iV-3000
D = 560mm for CKL-iV-4400
D = 560mm for CKL-iV-5800



Insulating adaptor cone from rectangular to round, length 100mm

D = 315mm for CKL-A-1300 (set = 2 pce)
D = 315mm for CKL-iH-1300 (set = 4 pce)
D = 400mm for CKL-A-2200 (set = 2 pce)
D = 400mm for CKL-iH-2200 (set = 4 pce)
D = 450mm for CKL-A-3000 (set = 2 pce)
D = 450mm for CKL-iH-3000 (set = 4 pce)
D = 560mm for CKL-A-4400 (set = 2 pce)
D = 560mm for CKL-A-5800 (set = 2 pce)
D = 560mm for CKL-iH-4400 (set = 4 pce)
D = 560mm for CKL-iH-5800 (set = 4 pce)



Silencer length 600 mm, all-round insulation 90mm

D = 315mm for CKL-1300, attenuation 8 dB / 250 Hz
D = 400mm for CKL-2200, attenuation 6 dB / 250 Hz
D = 450mm for CKL-3000, attenuation 6 dB / 250 Hz
D = 560mm for CKL-4400, attenuation 5 dB / 250 Hz
D = 560mm for CKL-5800, attenuation 5 dB / 250 Hz

Control accessories



Air quality sensor; plug-in design

Mixed gas sensor for detecting air quality in offices, hotels, homes, businesses, restaurants etc.

Supply voltage:	24 V AC/DC
Permiss. ambient temperature:	0 – 50 °C
IP rating:	IP30
Dimensions:	81 x 79 x 26 mm



CO₂ sensor; plug-in design (alternative to air quality sensor)

CO₂ sensor for detecting CO₂ content

Supply voltage:	24 V AC/DC
Permiss. ambient temperature:	0 – 50 °C
IP rating:	IP30
Dimensions:	95 x 97 x 30 mm



Room temperature sensor

Wall mounted, 2-pole, terminals up to 1.5 mm²

Sensor:	NTC5K
Measuring range:	-30 to +50 °C
IP rating:	IP54
Dimensions:	100 x 60 x 33 mm



Outside temperature sensor

Wall mounted, 2-pole, terminals up to 1.5 mm²

Sensor:	NTC5K
Measuring range:	-30 to +50 °C
IP rating:	IP54
Dimensions:	100 x 60 x 33 mm



LON Interface module for WRS-K for fitting on the controller KLM

For communication between the control unit and the building management system using the LON standard network variables, in the form of an expansion card in which the DDC control unit is integrated. Transceiver FTT-10A/78 kbit/s. Connection via plug-in/screw terminals. The module is linked to the existing BMS on site.



BacNet Interface module for WRS-K for fitting on the controller KLM

For communication between the control unit and the building management system, in the form of an expansion card in which the DDC control unit is integrated. Supported protocols: BacNet Ethernet/BacNet IP. Connection via RJ45 interface. The module is linked to the existing BMS on site.



Ethernet Interface module for WRS-K for fitting on the controller KLM

Designed as PCB integrated in the DDC control unit for connecting the system to an Ethernet network (LAN). Supported records are HTTP/FTP. Connection via RJ45 interface. The integration of the module into the existing network is to be provided on site.



Modbus - Schnittstelle für WRS-K zum Einstecken am Regler KLM

For communication between the control unit and the building management system, in the form of an expansion card in which the DDC control unit is integrated. Modbus Slave RTU. Connection via plug-in/screw terminals. The module is linked to the existing BMS on site.



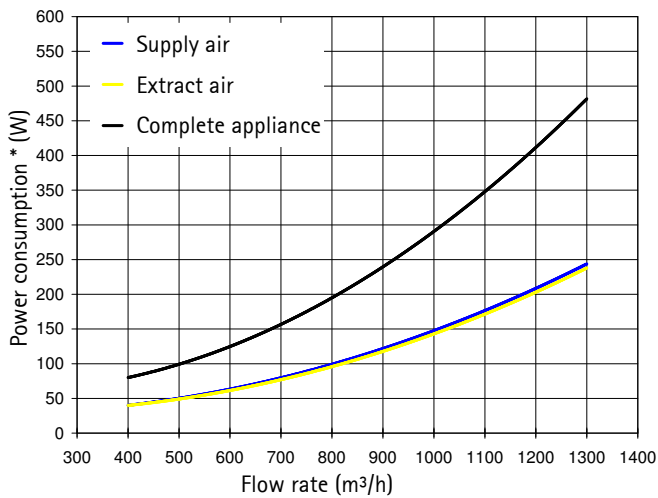
Remote control unit BMK-F for wall mounting with integrated room temperature

sensor 6 function keys: On / Off, manual / auto, speed, fresh air, extension of utilisation time, peak ventilation; LCD display; fault message signalling, power supply 24VAC, interface RS485 (pLAN), protection IP30. Functions: Switch on / off the system, speed setting, fresh air proportion setting, activation of the extension of utilisation time, activation of peak ventilation, adjust temperature set value. Dimensions: 135x86x30mm.

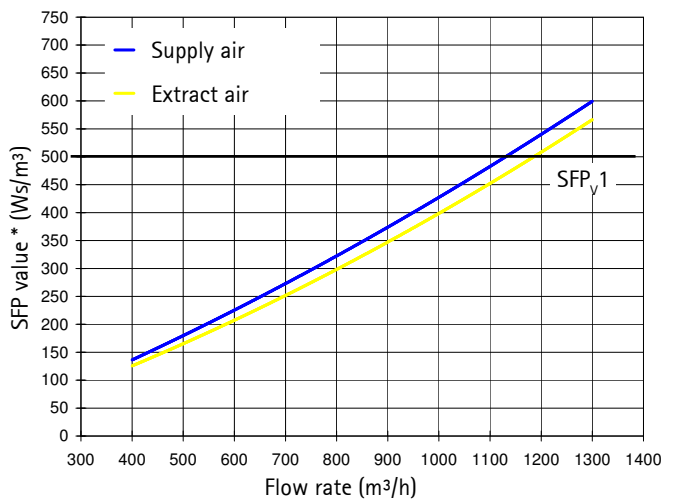
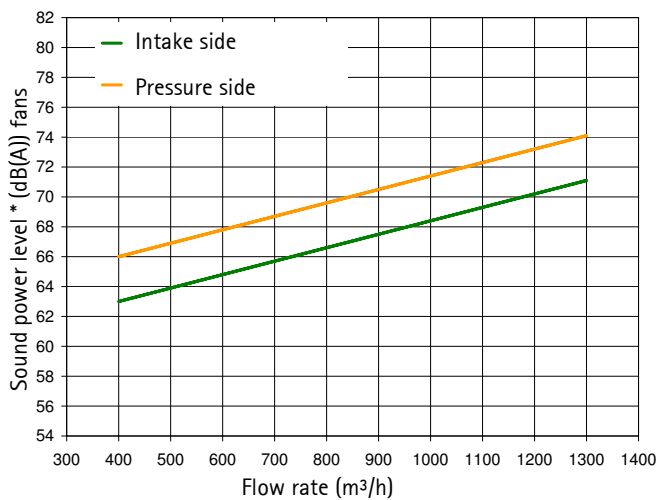
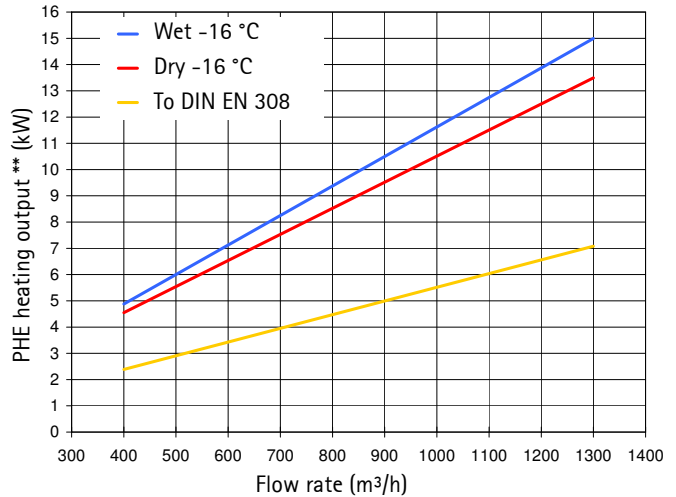
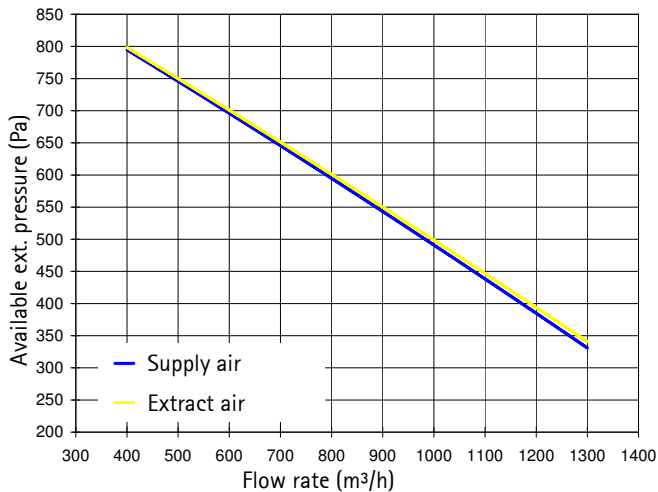
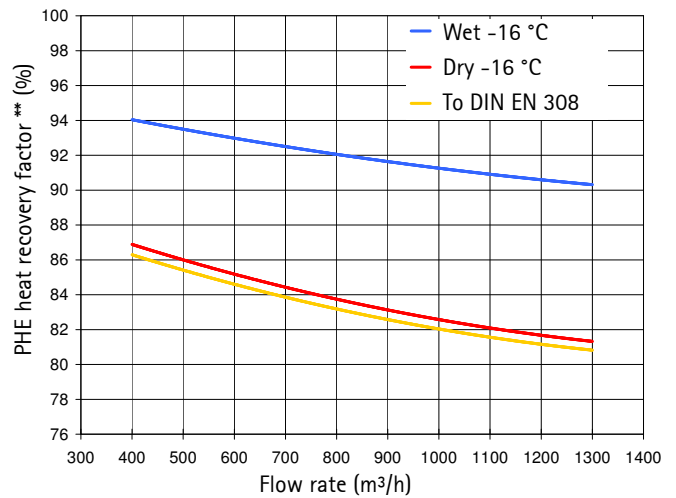
CKL-1300 performance diagrams

Exact technical data can only be supplied in relation to a specific project.

EC motor/fan unit



PHE heat recovery



* with free intake and free discharge (without accessories)

** Operating conditions:

ETA +22 °C 40% r.h.

ODA -16 °C

\dot{m} 1:1

DIN EN 308 conditions

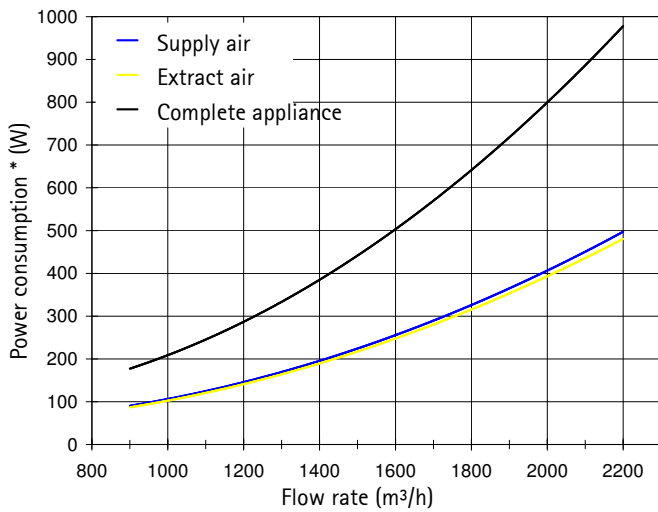
ETA +25 °C 25% r.h.

ODA +5 °C

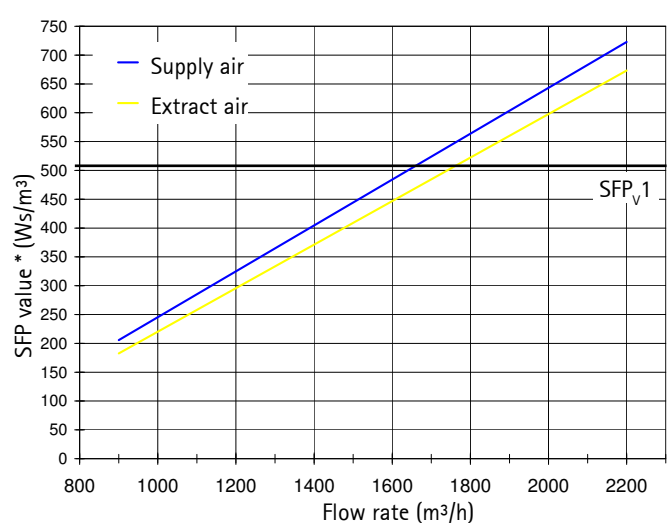
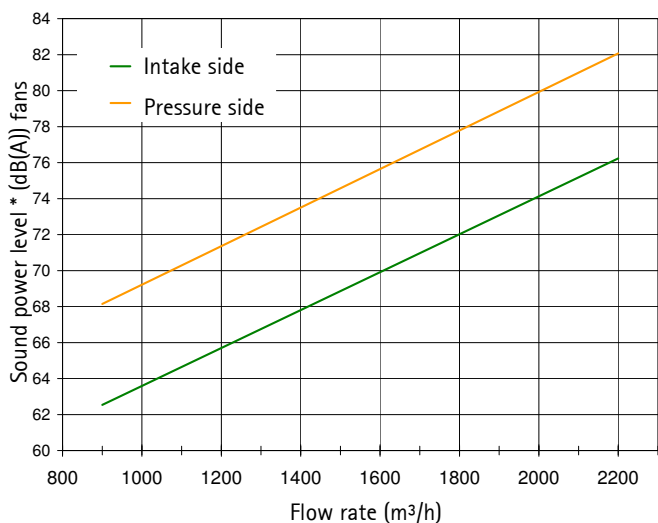
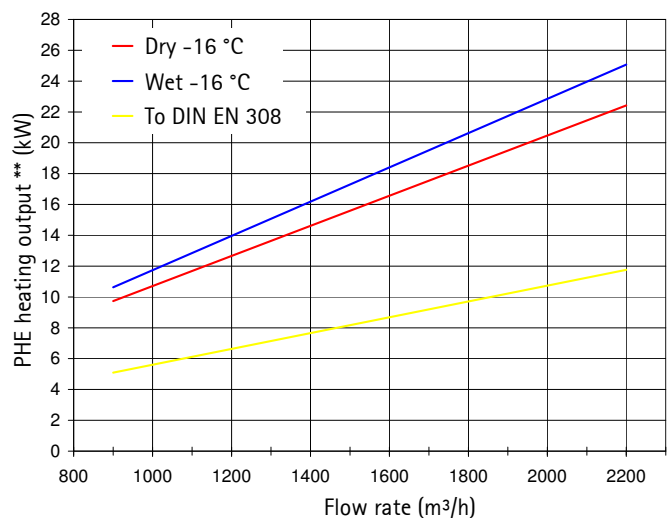
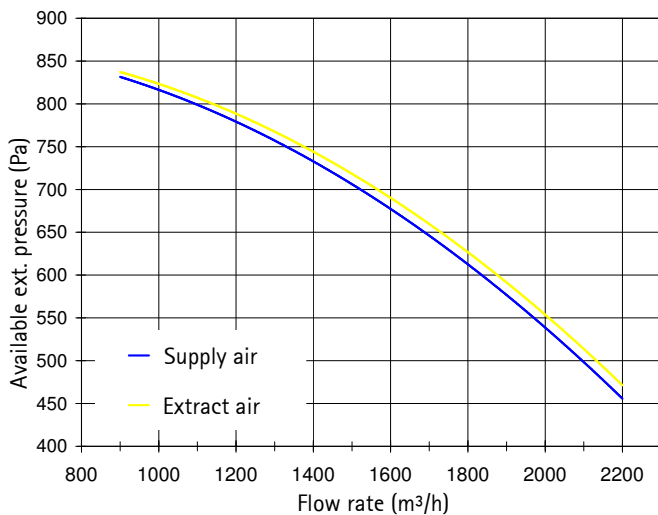
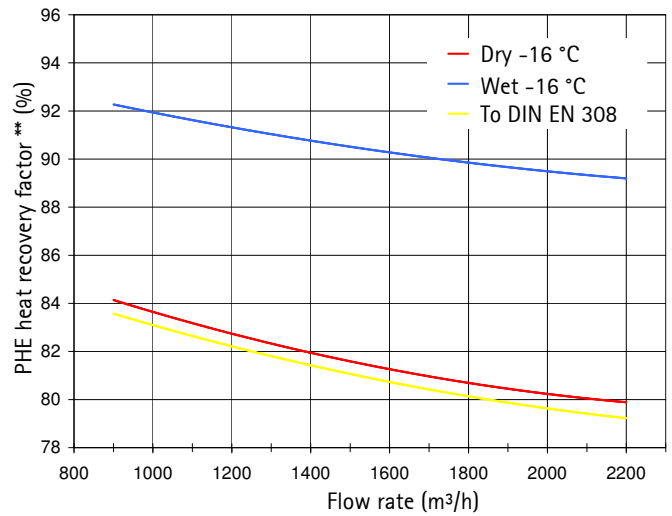
CKL-2200 performance diagrams

Exact technical data can only be supplied in relation to a specific project.

EC motor/fan unit



PHE heat recovery



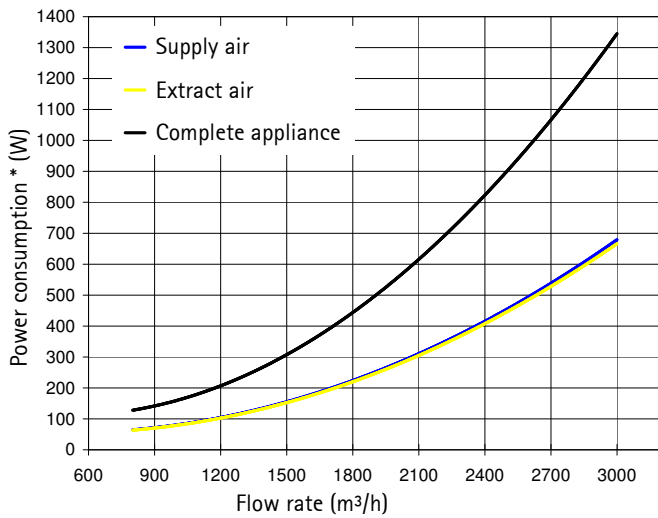
* with free intake and free discharge (without accessories)

** Operating conditions: \dot{m} 1:1
 ETA +22 °C 40% r.h. DIN EN 308 conditions
 ODA -16 °C ETA +25 °C 25% r.h.
 ODA +5 °C

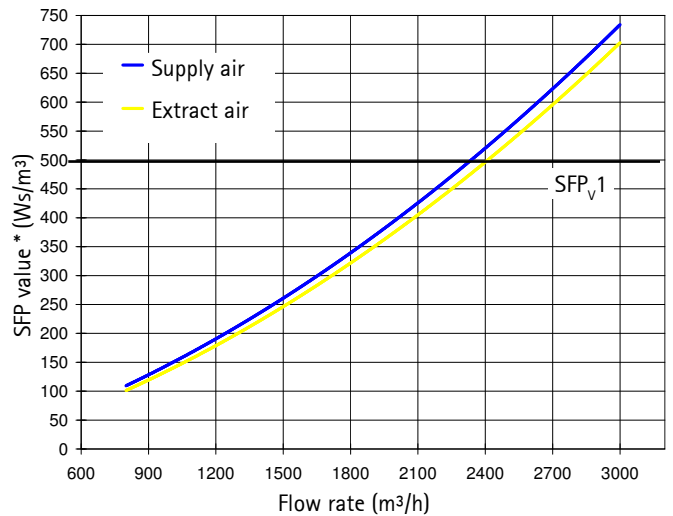
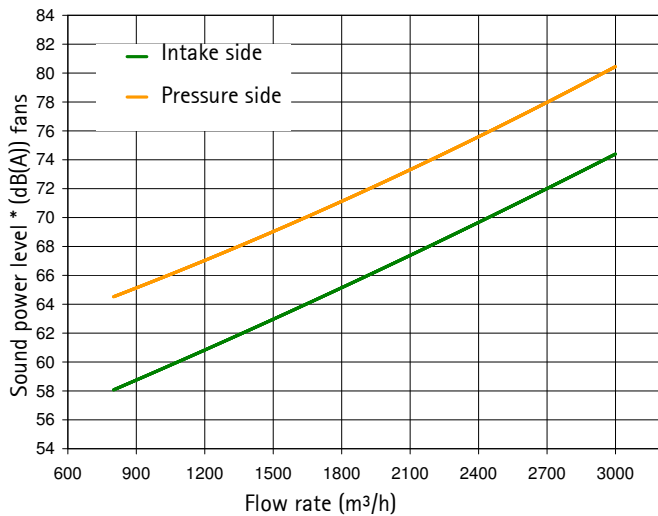
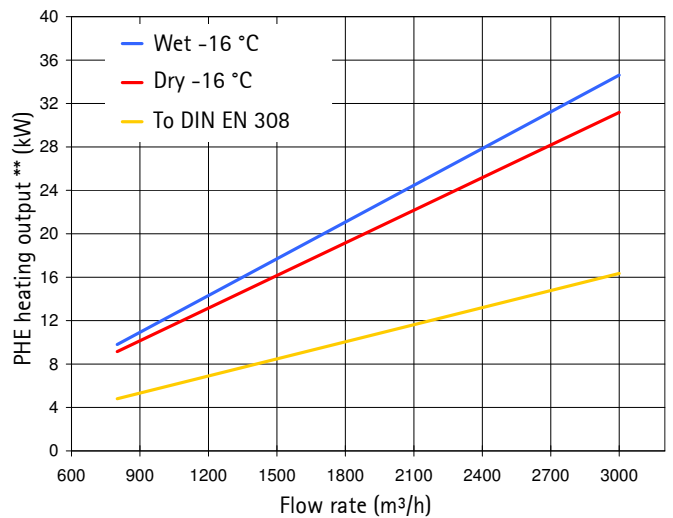
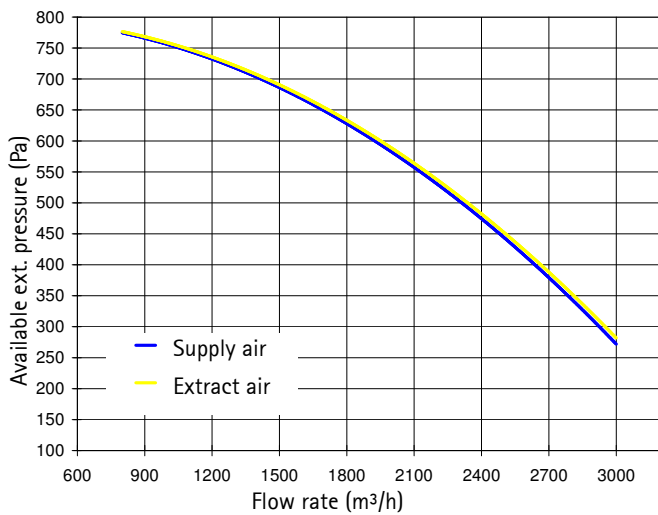
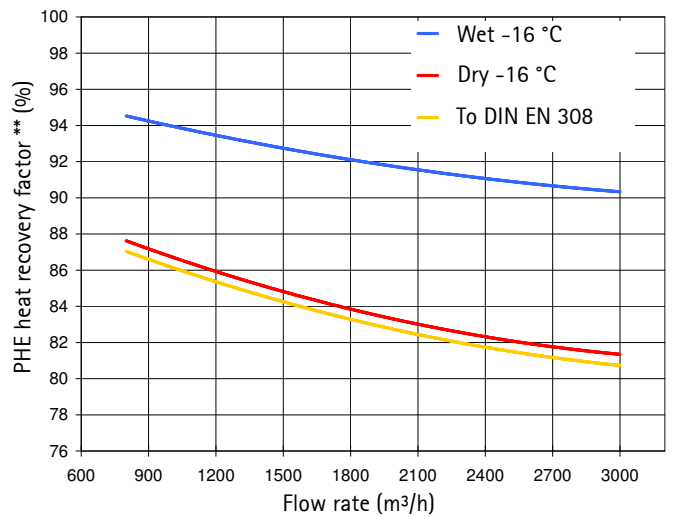
CKL-3000 performance diagrams

Exact technical data can only be supplied in relation to a specific project.

EC motor/fan unit



PHE heat recovery



* with free intake and free discharge (without accessories)

** Operating conditions:

ETA +22 °C 40% r.h.

ODA -16 °C

m 1:1

DIN EN 308 conditions

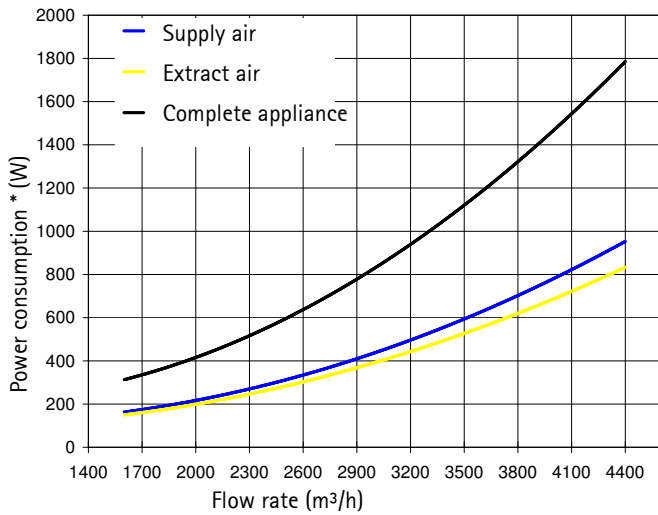
ETA +25 °C 25% r.h.

ODA +5 °C

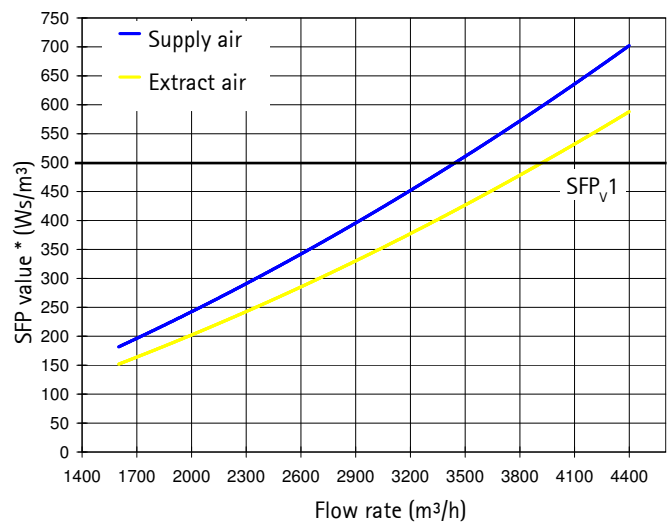
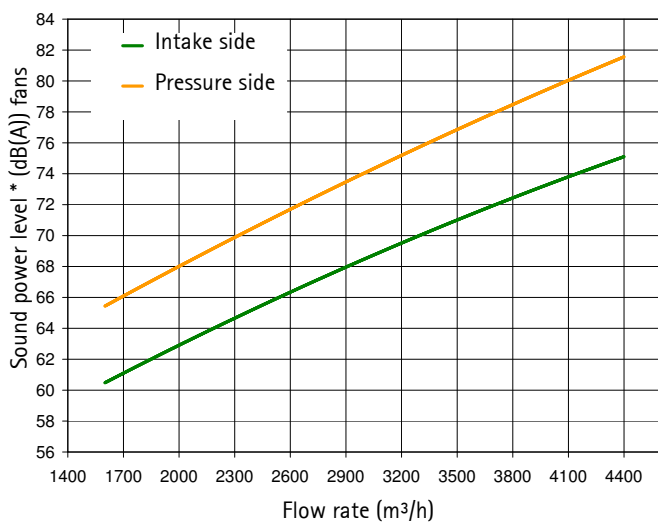
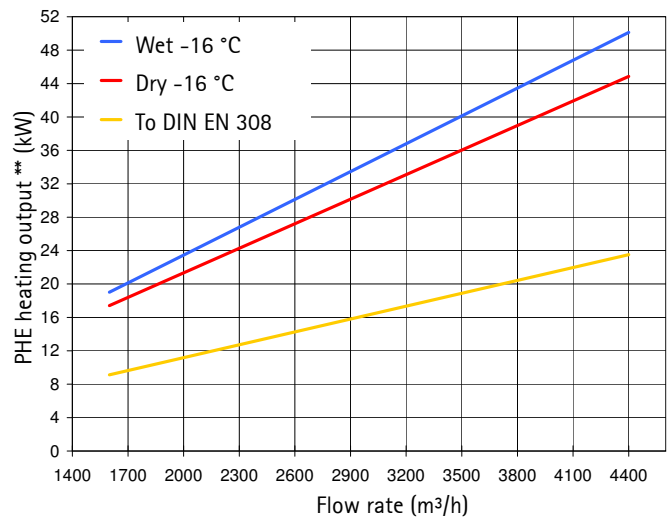
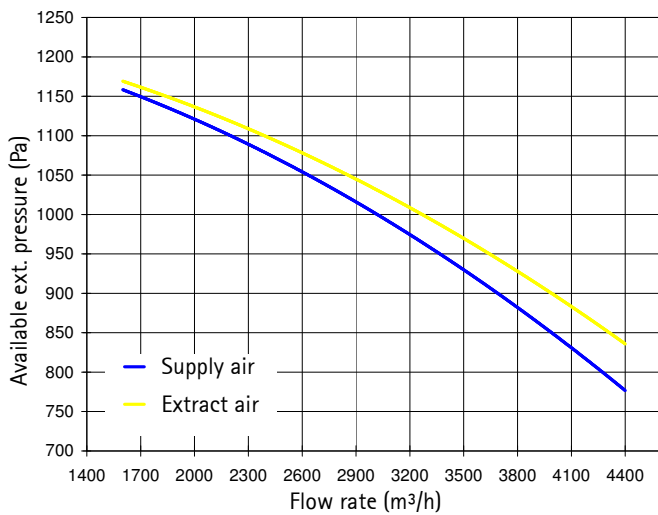
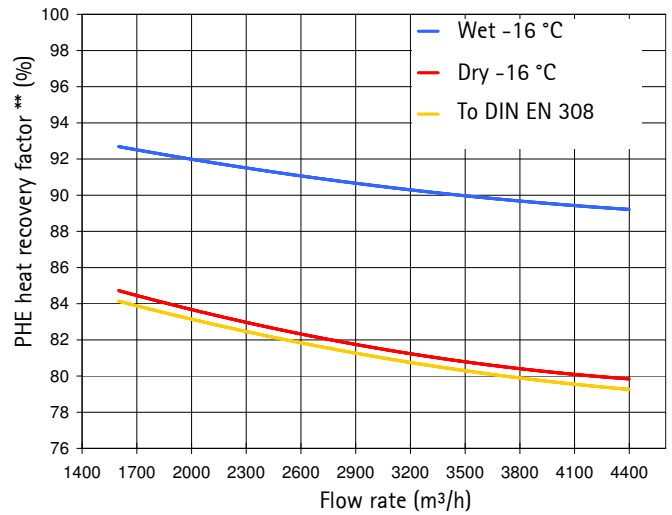
CKL-4400 performance diagrams

Exact technical data can only be supplied in relation to a specific project.

EC motor/fan unit



PHE heat recovery



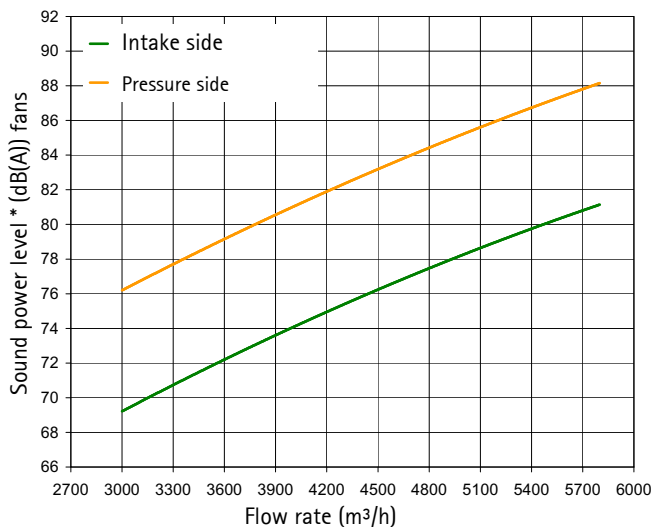
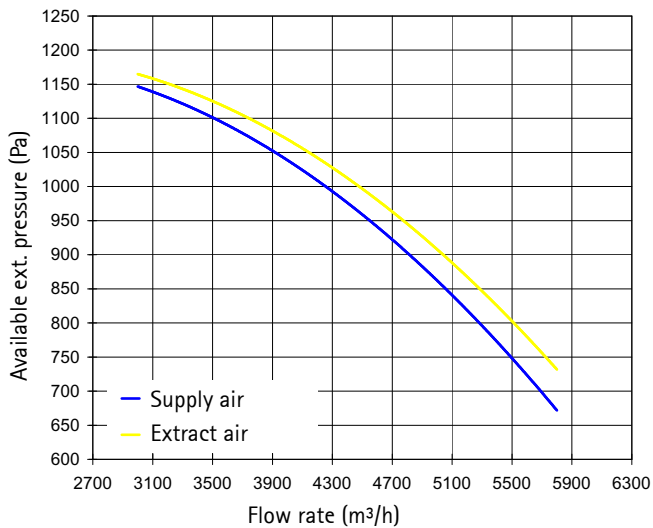
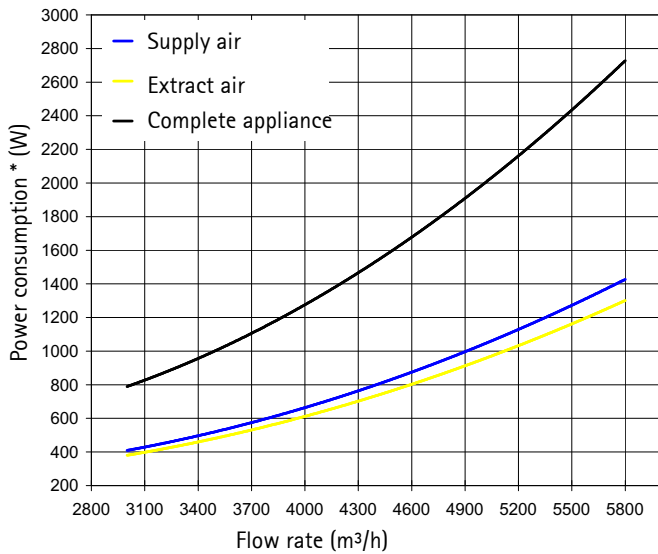
* with free intake and free discharge (without accessories)

** Operating conditions: \dot{m} 1:1
 ETA +22 °C 40% r.h. DIN EN 308 conditions
 ODA -16 °C ETA +25 °C 25% r.h.
 ODA +5 °C

CKL-5800 performance diagrams

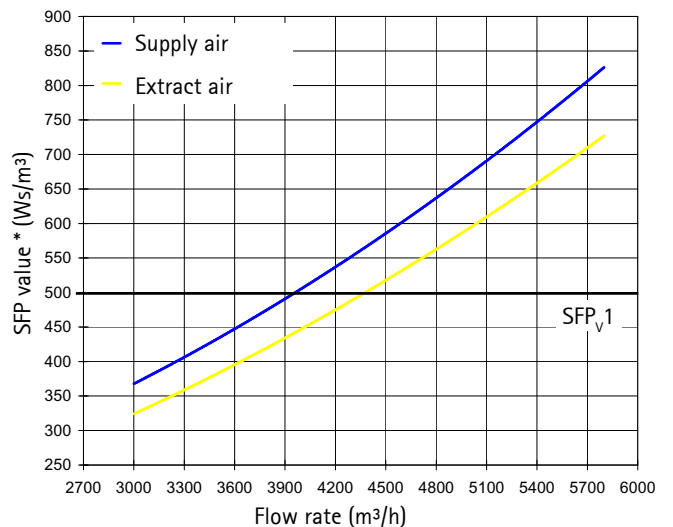
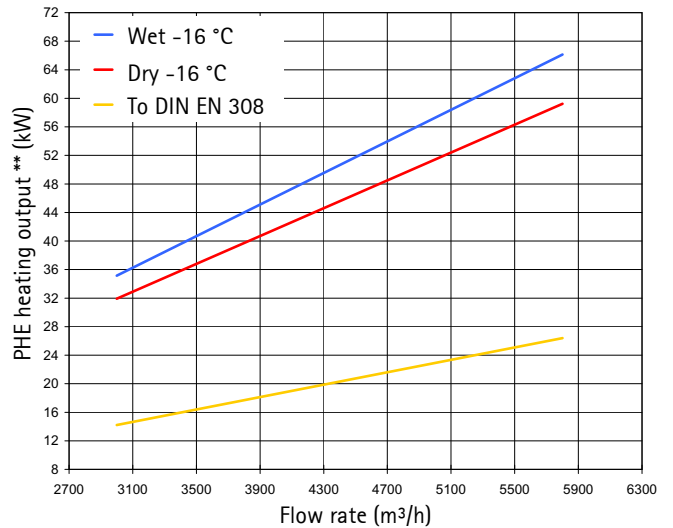
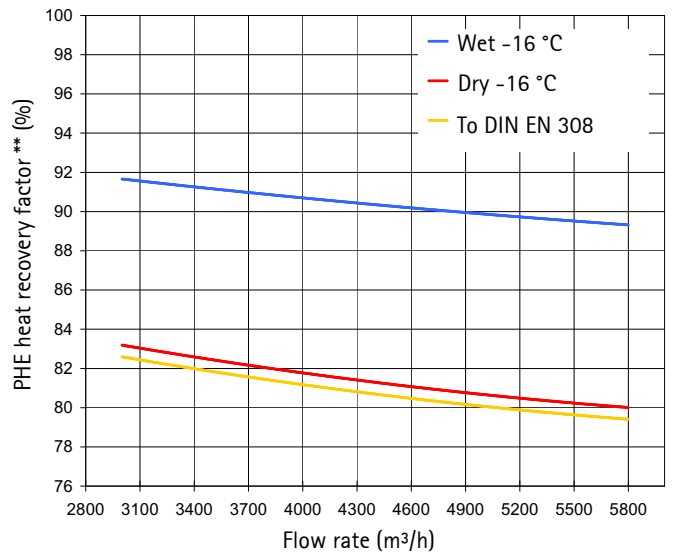
Exact technical data can only be supplied in relation to a specific project.

EC motor/fan unit



* with free intake and free discharge (without accessories)

PHE heat recovery



** Operating conditions: \dot{m} 1:1

ETA +22 °C 40% r.h.

ODA -16 °C

DIN EN 308 conditions

ETA +25 °C 25% r.h.

ODA +5 °C

Design information

Indoor air quality

Indoor air quality is determined by the following three factors (see also DIN EN 15251 or DIN EN 13779):

- **Emissions from persons and their activities**
Carbon dioxide emissions from a person's respiration, biological vapours, smoking, personal hygiene products etc.
- **Emissions from the room**
Vapours from furniture, carpets, paint, adhesives etc.
- **Outdoor air conditions**
Rural areas, urban areas, dust, fine dust, pollen etc.

Design criteria

In accordance with DIN EN 15251, various categories are used for indoor air quality and ventilation rate criteria.

Description of the applicability of the categories used

Category	Description
1	High level of expectation is recommended for spaces occupied by very sensitive and fragile persons with special needs like disabled, sick, very young children and elderly persons.
2	Standard level of expectation should be applied to new buildings and renovation projects.
3	An acceptable, moderate level of expectation may be applied to existing buildings.
4	Values outside the criteria for the above categories: This category should only be accepted for a limited part of the year.

As carbon dioxide concentration rises, the ability to concentrate and perform declines, tiredness increases and people feel uncomfortable.

Carbon dioxide is a natural constituent of the earth's atmosphere and is found in outdoor air in concentrations ranging from around 350 ppm (rural areas) to around 500 ppm (urban areas).

Design information

CO₂ level in indoor environments according to DIN 15251 or DIN EN 13779

The following table from DIN EN 13779 shows the minimum recommended values for outdoor air flow per person. The design air flow rate also takes into account emissions from other sources such as materials and furniture.

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

Minimum air volumes per person (based on max. CO₂ requirement)

Age-dependent rates			
For approx. age	Target 1200 ppm	Target 1000 ppm	Target group
0 – 6	19 m ³ /h	25 m ³ /h	Kindergarten
6 – 10	19 m ³ /h	25 m ³ /h	Primary school
10 – 14	23 m ³ /h	30 m ³ /h	Secondary school
14 – 19	24 m ³ /h	33 m ³ /h	Technical college
Adults	28 m ³ /h	37 m ³ /h	

Design information

Example calculations:

$$\text{l/s} \times 3.6 = \text{m}^3/\text{h}$$

Example 1:

School, 2 classrooms, each with 30 children aged 6 – 10 and one teacher

Required air volume per room, according to max. CO₂ requirement of 1200 ppm

$$\begin{aligned} \text{Calculation: } 2 \times 30 \text{ persons} \times 19 \text{ m}^3/\text{h} &= 1140 \text{ m}^3/\text{h} \\ 2 \times 1 \text{ teacher} \times 28 \text{ m}^3/\text{h} &= 56 \text{ m}^3/\text{h} \end{aligned}$$

$$\text{Required outdoor air volume: } = 1196 \text{ m}^3/\text{h}$$

Example 2:

Required interior category: 3 – Non-smoking area (standard value)

40 persons

Air volume per room:

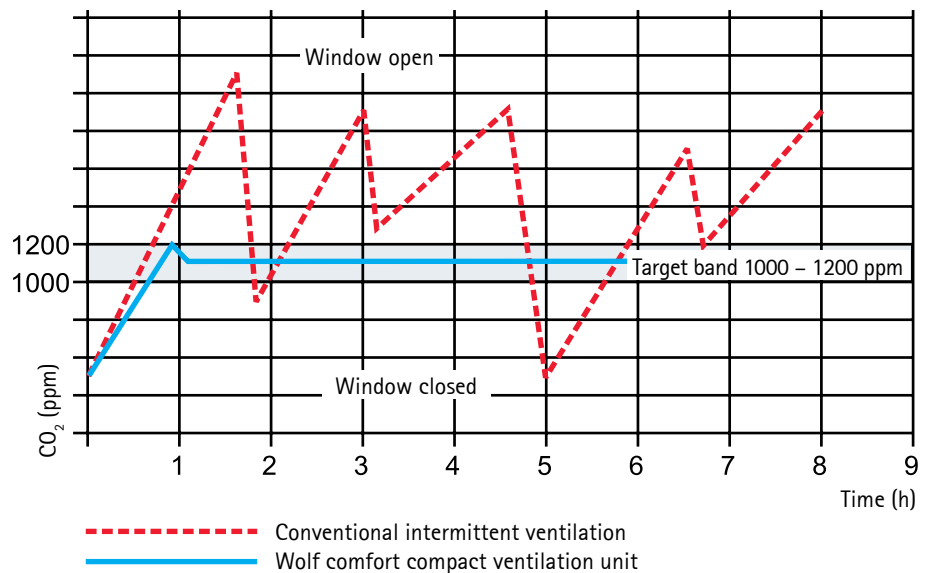
$$\text{Calculation: } 40 \text{ persons} \times 8 \text{ l/s} = 320 \text{ l/s}$$

$$\text{Required outdoor air volume: } = 320 \text{ l/s} = 1152 \text{ m}^3/\text{h}$$

Note:

If greater air volumes are required, appliances from our KG Top range of air handling units can be used.

Comparison with intermittent ventilation:

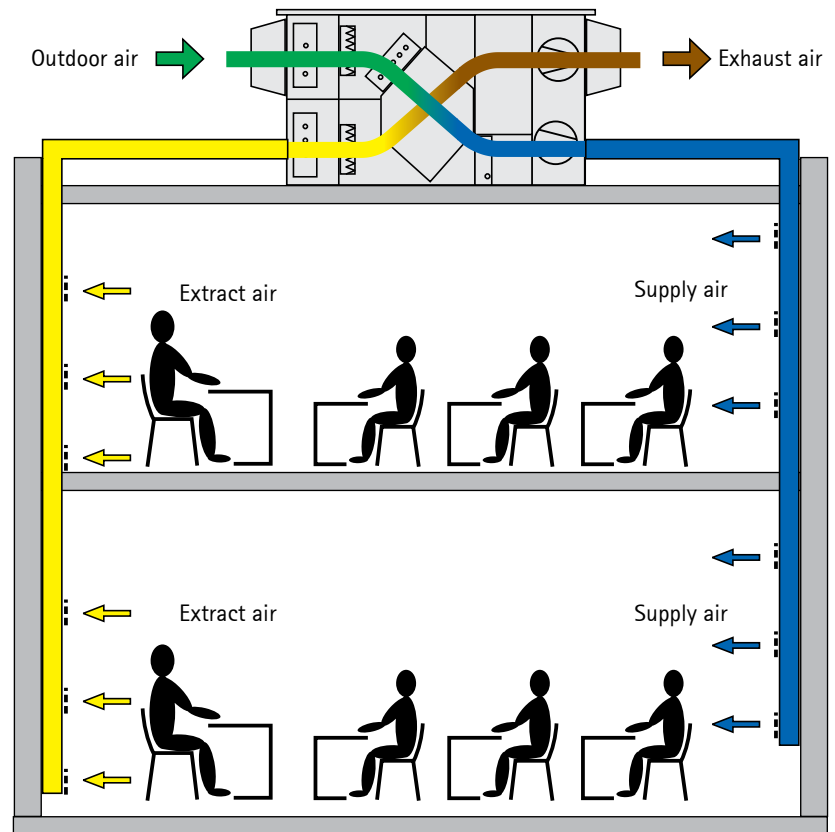


Noise level in indoor environments according to DIN 15251 or DIN EN 13779

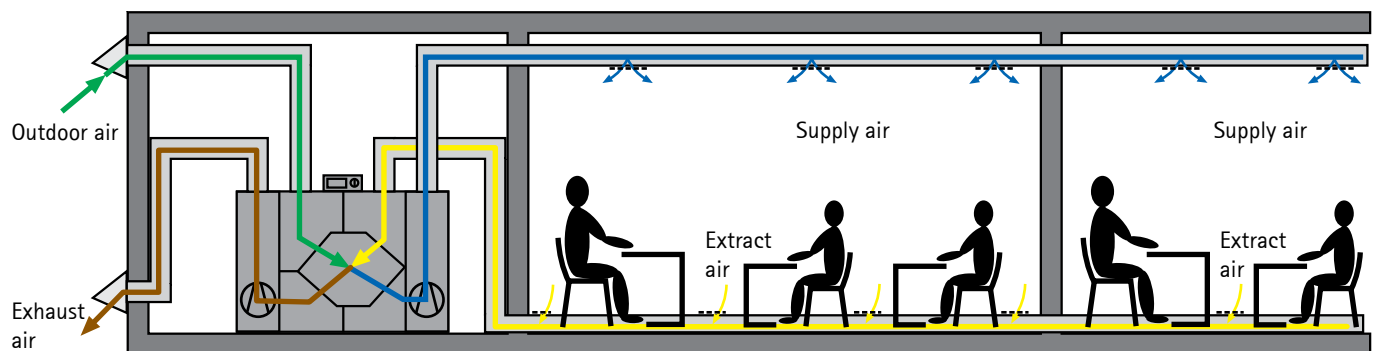
Type of building/room	Recommended sound pressure range (dBA)
Open-plan office	35 – 45
Conference room	30 – 40
Classroom, kindergarten	35 – 45
Cafeterias / Restaurants	35 – 50
Shops	35 – 50

Design information

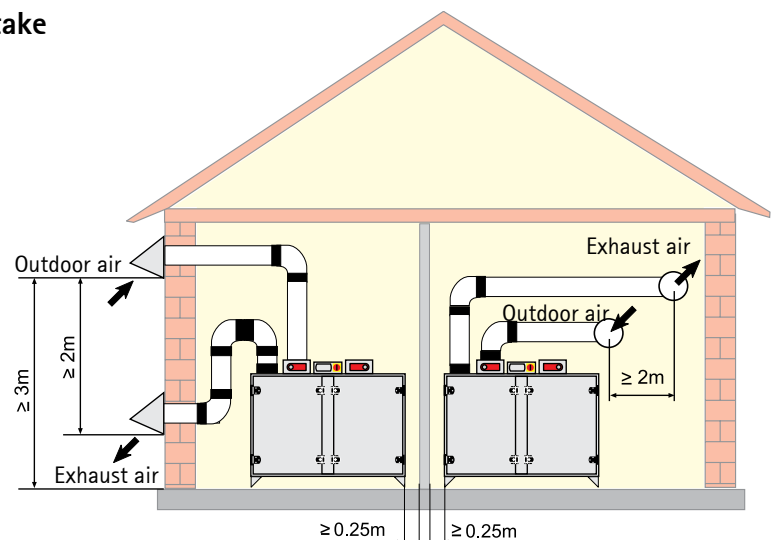
Function view of air intake handling: CKL-A



Unit positioned in adjoining room



Minimum clearance between outdoor air intake and exhaust air discharge to prevent an "air short circuit" (DIN EN 13779)



Tender documentation

Item	Pce	Comfort compact ventilation unit CKL	Individual price	Total price																										
		<p>Application:</p> <p>The CKL from Wolf Mainburg is designed as a decentralised and centralised ventilation unit with heat recovery. Alongside use in classrooms, the unit is also ideal for applications in conference rooms, hairdressing salons, pubs, offices, canteens, restaurants, smoking rooms and kindergartens.</p> <p>Ventilation unit in accordance with VDI 6022; EnEV-compliant; energy efficiency category A+.</p> <p>Ventilation unit fitted with high performance heat recovery system made from corrosion-resistant aluminium alloy with extremely high heat recovery factor up to and exceeding 90%; including integral control, F7 pollen filter (supply air) and F5 extract air filter.</p> <p>Outdoor/exhaust air dampers, airtight, category K2, as standard; external gears with special contact gasket; max. torque < 2.0 Nm; switched via mounted open/close servomotor 230 V/50 Hz, power consumption 2 VA; 1 W.</p> <p>Free-running fans with highly efficient, backwards curved aluminium impellers, direct drive via energy efficient EC motors (more efficient than EFF 1); infinitely variable via 0 – 10 V control signal; extensive, costly installation with screened cables and inverters is not required.</p> <p>The ventilation unit is supplied ready to install with full internal wiring incl. WRS control unit, ON/OFF switch and safety elements.</p> <p>The wiring is designed to be hygienic thanks to cable runs in the rear panel.</p> <p>External electrical connection and air pipe connection to be carried out on site.</p> <p>Appliance classification to EN 1886</p> <p>Ventilation units of the CKL series are classified as complete appliances in category A1 "non-combustible" to DIN 4102. The units are CE-certified.</p> <p>Heat transfer category T2</p> <p>Filter bypass leakage = less than 2%</p> <p>Enclosure tightness Tightness category L2</p> <p>Mechanical strength Housing category D1</p> <p>Insert attenuation De of housing:</p> <table><tr><td>125 Hz</td><td>250 Hz</td><td>500 Hz</td><td>1000 Hz</td><td>2000 Hz</td><td>4000 Hz</td><td>8000 Hz</td></tr><tr><td>17.0 dB</td><td>26.0 dB</td><td>31.0 dB</td><td>34.0 dB</td><td>36.0 dB</td><td>38.0 dB</td><td>44.0 dB</td></tr></table> <p>Specification:</p> <table><tr><td>Thermal insulation:</td><td>Thickness 50 mm</td></tr><tr><td>Building material category (to DIN 4102)</td><td>A1 (non-combustible)</td></tr><tr><td>Density weight of mineral wool insulation</td><td>27 kg/m³</td></tr><tr><td>Thermal conductivity</td><td>0.04 W/mK</td></tr></table> <p>Casing:</p> <table><tr><td>Heat transfer coefficient k</td><td>0.6 W/m²K</td></tr><tr><td>Sound insulation Rw (to DIN ISO 717 Part 1)</td><td>41 dB (with test certificate)</td></tr></table> <p>Constructed as inherently stable and height-adjustable (30 mm) unit (<u>internal unit</u>).</p> <p>The panel (without thermal bridges) consists of powder-coated sheet steel, coating thickness 70 µm, smooth, glossy in external wall quality, commercial white RAL 9016.</p> <p>UV-resistant coating, glossiness 87, density 1.56 g/cm³, impact according to ASTM D 2794 > 20 ip. Intermediate panel, silver, RAL 9006.</p> <p>Panel with intermediate thermal insulation for optimal sound and thermal insulation made from mineral wool, building material category A1, non-combustible to DIN 4102.</p> <p>Inspection doors extending across the entire operating height of the unit for optimal access to inspection parts.</p> <p>Thickness of casing panels 50 mm, comprising internal and external casing panels without thermal bridges made from powder-coated sheet steel to EN 10142 and EN 10143. Sound and thermal insulation provided by high grade, non-combustible mineral wool insulation, density weight 27 kg/m³, building material category A1 to DIN 4102. Thermal insulation between internal and external casing secured to prevent slippage and being shaken loose.</p> <p><u>Weatherproof CKL-A version</u></p> <p>Base frame mounted at 300 mm, cover with intake hood incl. intern. mist eliminator; discharge hood; programming unit can be used unconnected as a remote control.</p>	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	17.0 dB	26.0 dB	31.0 dB	34.0 dB	36.0 dB	38.0 dB	44.0 dB	Thermal insulation:	Thickness 50 mm	Building material category (to DIN 4102)	A1 (non-combustible)	Density weight of mineral wool insulation	27 kg/m³	Thermal conductivity	0.04 W/mK	Heat transfer coefficient k	0.6 W/m²K	Sound insulation Rw (to DIN ISO 717 Part 1)	41 dB (with test certificate)		
125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz																								
17.0 dB	26.0 dB	31.0 dB	34.0 dB	36.0 dB	38.0 dB	44.0 dB																								
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Building material category (to DIN 4102)	A1 (non-combustible)																													
Density weight of mineral wool insulation	27 kg/m³																													
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Heat transfer coefficient k	0.6 W/m²K																													
Sound insulation Rw (to DIN ISO 717 Part 1)	41 dB (with test certificate)																													

Tender documentation

Item	Pce		Individual price	Total price
		<p>Countercurrent plate heat exchanger (PHE)</p> <p>Countercurrent heat exchanger in the form of a highly efficient, corrosion-resistant plate heat exchanger with heat recovery factors up to and exceeding 90%. For sizing to EN 308 above 80%. Recuperative heat and cold recovery according to VDI 2071. Heat recovery factor and pressure drop can be better than H1 according to EN 13053.</p> <p>Supplied as countercurrent plate heat exchanger for utilising the sensible and latent thermal energy present in air streams.</p> <p>Extract and outdoor air streams are kept completely separate. The air is conveyed along thin aluminium plates arranged in parallel according to the countercurrent principle. This prevents moisture or odours from being transferred.</p> <p>The plates consist of corrosion-resistant aluminium.</p> <p>High levels of efficiency result from optimised and large-surface plate structures.</p> <p>As standard, unit is supplied with drain pans in the supply air and extract air areas for easy cleaning and collection of any condensate forming due to the dehumidification of extract air.</p> <p>Hygienic condensate drain in the unit thanks to 3D stainless steel condensate pans that can be connected to a condensate drain pipe on site.</p> <p>Integral bypass for summer operation without heat recovery and for energy saving night cooling. Optimised bypass operation via tightly sealed K2 air dampers (DIN EN 779) without internal gears. Switched via fitted variable speed servomotor 230 V/50 Hz.</p> <p>Free-running EC fans</p> <p>High performance radial fan modules, single sided intake with direct drive via EC motor 1 x 230 V/50 Hz, efficiency class IE3 for CKL-1300; 3 x 400 V/50 Hz, efficiency class IE3 for CKL-2200, CKL-3000, CKL-4400 and CKL-5800.</p> <p>2D radial impeller with circulation diffuser, mounted and balanced on an electronically commutated external rotor motor with integral electronics.</p> <p>Backwards curved impellers; optimised intake nozzles made from zinc-plated sheet steel.</p> <p>EC external rotor motor with maintenance-free ball bearings with long-term lubrication, wide voltage input range 200 – 277 V, 50/60 Hz for CKL-1300; wide voltage input range 380 – 480 V, 50/60 Hz for CKL-2200, CKL-3000, CKL-4400 and CKL-5800.</p> <p>Unit can be used on all conventional power supply utility networks providing uniform air handling; optimised motor technology, soft starter, integral current limitation.</p> <p>Highly compact electronics design with adjustable PID controller, fulfils all necessary EMC guidelines and all requirements relating to perturbation.</p> <p>No extensive installation with screened cables required; very low noise commutation logic, 100% controllable.</p> <p>IP rating IP54, insulation class B for CKL-1300, CKL-2200 and CKL-3000,</p> <p>IP rating IP54, insulation class F for CKL-4400 and CKL-5800.</p> <p>Maximum permissible air temperature 40 °C at rated output.</p> <p>Motor/fan unit is built into the unit and is flow-optimised and insulated against structure-borne noise, fitted with accessible pressure test nipple for simple determination of flow rate, suitable for instrumentation connection.</p> <p>Safety mechanisms:</p> <ul style="list-style-type: none"> - Anti-blocking protection - Motor soft start - Mains undervoltage detection - Protection of electronics and motor against overtemperatures - Short circuit protection - Function tested 		

Tender documentation

Item	Pce		Individual price	Total price
		F7 filter Ashable compact panel filter in the supply air line to quality grade F7; acts as fine dust filter and as pollen filter; long service life due to large filter area. Temperature-resistant to 60 °C. Filter monitoring via differential barometric cell (contamination monitoring VDI 6022).		
		F5 filter Ashable compact panel filter in the extract air line to quality grade F5; long service life due to large filter area. Temperature-resistant to 60 °C. Filter monitoring via differential barometric cell (contamination monitoring VDI 6022).		
		Accessories Electric pre-heater bank, single stage; for preheating the filter, switches on automatically below +5 °C; may be retrofitted; plug-in design. 1 kW for CKL-1300 2 kW for CKL-2200 and CKL-3000 4 kW for CKL-4400 and CKL-5800 Electric booster heater bank, 1 kW; infinitely variable, (1 x 230 V for CKL-1300), may be retrofitted; plug-in design. Electric booster heater bank, 4 kW; infinitely variable, (3 x 400 V for CKL-2200) Elektrisches Nachheizregister, 6kW; infinitely variable, (3x400V bei CKL-3000) Heat exchanger LPHW (low pressure hot water) CU-Al heat exchanger for supply air re-heating, correctly sized, suitable for low temperature tv/tr 50 °C/40 °C, can be integrated into the unit; for CKL-1300 (may be retrofitted; plug-in frost protection) 3 kW CKL-2200 (may be retrofitted; plug-in frost protection) 5 kW CKL-3000 (may be retrofitted; plug-in frost protection) 6 kW CKL-iV/A-4400 (may be retrofitted; plug-in frost protection) 11 kW CKL-iV/A-5800 (may be retrofitted; plug-in frost protection) 15 kW for CKL-iH-4400, 5800 extension module (Heating/Cooling coil, Drop Eliminator) required HCDE sections for iH and A units or dx coils Extension module for heating/cooling coil and Drop Eliminator for heating or cooling of the supply air. suitable for low temperature heating tflow/tret = 50/40 °C, tL = 10°C CKL 1300 Heating output 7kW CKL 2200 Heating output 12 kW CKL 3000 Heating output 16 kW CKL 4400 Heating output 25 kW CKL 5800 Heating output 30 kW for cooling of the supply air 28°, 50% r.h., tflow/tret = 6/12 CKL 1300 Cooling output 5 kW CKL 2200 Cooling output 9 kW CKL 3000 Cooling output 13 kW CKL 4400 Cooling output 19 kW CKL 5800 Cooling output 34 kW		

Tender documentation

Item	Pce		Individual price	Total price
		Mixing valve for LPHW coil HCDE – heat exchanger		
		Mixing valve for chw coil		
		DN10 KVS 0,63		
		DN10 KVS 1,0		
		DN10 KVS 1,6		
		DN15 KVS 2,5		
		DN20 KVS 4,0		
		DN25 KVS 6,3		
		DN25 KVS 10,0		
		DN32 KVS 16,0		
		DN40 KVS 25,0		
		Actuator for mixing valve		
		Insulating frame for		
		CKL-iV-1300 (set = 4 pce)		
		CKL-iH-1300 (set = 4 pce)		
		CKL-A-1300 (set = 2 pce)		
		CKL-iV-2200 (set = 4 pce)		
		CKL-iH-2200 (set = 4 pce)		
		CKL-A-2200 (set = 2 pce)		
		CKL-iV-3000 (set = 4 pce)		
		CKL-iH-3000 (set = 4 pce)		
		CKL-A-3000 (set = 2 pce)		
		CKL-iV-4400 (Satz = 4 pce)		
		CKL-iH-4400 (Satz = 4 pce)		
		CKL-A-4400 (Satz = 2 pce)		
		CKL-iV-5800 (Satz = 4 pce)		
		CKL-iH-5800 (Satz = 4 pce)		
		CKL-A-5800 (Satz = 2 pce)		
		Flexible connection for		
		CKL-iV-1300 (set = 4 pce)		
		CKL-iH-1300 (set = 4 pce)		
		CKL-A-1300 (set = 2 pce)		
		CKL-iV-2200 (set = 4 pce)		
		CKL-iH-2200 (set = 4 pce)		
		CKL-A-2200 (set = 2 pce)		
		CKL-iV-3000 (set = 4 pce)		
		CKL-iH-3000 (set = 4 pce)		
		CKL-A-3000 (set = 2 pce)		
		CKL-iV-4400 (Satz = 4 pce)		
		CKL-iH-4400 (Satz = 4 pce)		
		CKL-A-4400 (Satz = 2 pce)		
		CKL-iV-5800 (Satz = 4 pce)		
		CKL-iH-5800 (Satz = 4 pce)		
		CKL-A-5800 (Satz = 2 pce)		
		Adaptor box rectangular to round for vertical duct connection (set = 2 pce) for		
		CKL-iV-1300; Ø 315mm		
		CKL-iV-2200; Ø 400mm		
		CKL-iV-3000; Ø 450mm		
		CKL-iV-4400; Ø 560mm		
		CKL-iV-5800; Ø 560mm		

Item	Pce		Individual price	Total price
		Insulating adaptor cone rectangular to round for duct connection for CKL-A-1300, Ø 315mm (set = 2 pce) CKL-iH-1300, Ø 315mm (set = 4 pce) CKL-A-2200, Ø 400mm (set = 2 pce) CKL-iH-2200, Ø 400mm (set = 4 pce) CKL-A-3000, Ø 450mm (set = 2 pce) CKL-iH-3000, Ø 450mm (set = 4 pce) CKL-A-4400, Ø 560mm (set = 2 pce) CKL-iH-4400, Ø 560mm (Satz = 4 pce) CKL-A-5800, Ø 560mm (set = 2 pce) CKL-iH-5800, Ø 560mm (Satz = 4 pce)		
		Silencer length 600mm D = 315mm for CKL-1300 (attenuation 8 dB at 250 Hz) D = 400mm for CKL-2200 (attenuation 6 dB at 250 Hz) D = 450mm for CKL-3000 (attenuation 6 dB at 250 Hz) D = 560mm for CKL-4400 (attenuation 5 dB at 250 Hz) D = 560mm for CKL-5800 (attenuation 5 dB at 250 Hz)		

Tender documentation

Item	Pce	Specification:	Individual price	Total price
		<p>Make Wolf GmbH</p> <p>Unit type CKL-1300</p> <p>Max. air volume 1300 m³/h at ext. 300 Pa</p> <p>Ventilation fan:</p> <p>Power consumption 245 W</p> <p>SFP_v value 590 Ws/m³ (SFP_v 2)</p> <p>Extract fan:</p> <p>Power consumption 235 W</p> <p>SFP_v value 560 Ws/m³ (SFP_v 2)</p> <p>Weatherproof</p> <p>Unit height 1350mm incl. base frame and cover</p> <p>Unit width 812mm</p> <p>Unit length 2107mm incl. intake/discharge hood</p> <p>Weight 315kg</p> <p>Internal unit</p> <p>Unit height 1315mm incl. dampers and feet</p> <p>Unit width 712mm</p> <p>Unit depth 1525mm</p> <p>Weight 250kg</p> <p>Specification:</p> <p>Make Wolf GmbH</p> <p>Unit type CKL-2200</p> <p>Max. air volume 2200m³/h at ext. 400 Pa</p> <p>Ventilation fan:</p> <p>Power consumption 500 W</p> <p>SFP_v value 742 Ws/m³ (SFP_v 2)</p> <p>Extract fan:</p> <p>Power consumption 485 W</p> <p>SFP_v value 695 Ws/m³ (SFP_v 2)</p> <p>Weatherproof</p> <p>Unit height 1750mm incl. base frame and cover</p> <p>Unit width 812mm</p> <p>Unit length 2780mm incl. intake/discharge hood</p> <p>Weight 460kg</p> <p>Internal unit</p> <p>Unit height 1720mm incl. dampers and feet</p> <p>Unit width 712mm</p> <p>Unit depth 2033mm</p> <p>Weight 360kg</p>		

Tender documentation

Item	Pce	Specification:	Individual price	Total price
		<p>Make Wolf GmbH</p> <p>Unit type CKL-3000</p> <p>Max. air volume 3000 m³/h at ext. 250 Pa</p> <p>Ventilation fan:</p> <p>Power consumption 685 W</p> <p>SFP_v value 715 Ws/m³ (SFP_v 2)</p> <p>Extract fan:</p> <p>Power consumption 675 W</p> <p>SFP_v value 680 Ws/m³ (SFP_v 2)</p> <p>Weatherproof</p> <p>Unit height 1750mm incl. base frame and cover</p> <p>Unit width 1015mm</p> <p>Unit length 2780mm incl. intake/discharge hood</p> <p>Weight 555kg</p> <p>Internal unit</p> <p>Unit height 1720mm incl. dampers and feet</p> <p>Unit width 915mm</p> <p>Unit length 2034mm</p> <p>Weight 450kg</p> <p>Specification:</p> <p>Make Wolf GmbH</p> <p>Unit type CKL-4400</p> <p>Max. air volume 4400 m³/h at ext. 600 Pa</p> <p>Ventilation fan:</p> <p>Power consumption 955 W</p> <p>SFP_v value 705 Ws/m³ (SFP_v 2)</p> <p>Extract fan:</p> <p>Power consumption 835 W</p> <p>SFP_v value 590 Ws/m³ (SFP_v 2)</p> <p>Weatherproof</p> <p>Unit height 1750mm incl. base frame and cover</p> <p>Unit width 1422mm</p> <p>Unit length 2780mm incl. intake/discharge hood</p> <p>Weight 715kg</p>		

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Item	Pce	Specification:	Individual price	Total price
		<p>Make Wolf GmbH</p> <p>Unit type CKL-5800</p> <p>Max. air volume 5800 m³/h at ext. 550 Pa</p> <p>Ventilation fan:</p> <p>Power consumption 1430 W</p> <p>SFP_v value 825 Ws/m³ (SFP_v 3)</p> <p>Extract fan:</p> <p>Power consumption 1300 W</p> <p>SFP_v value 730 Ws/m³ (SFP_v 2)</p> <p>Weatherproof</p> <p>Unit height 1750mm incl. base frame and cover</p> <p>Unit width 1725mm</p> <p>Unit length 2780mm incl. intake/discharge hood</p> <p>Weight 800kg</p>		

Tender documentation

Item	Pce		Individual price	Total price
		CKL control unit description BMK programming module <ul style="list-style-type: none"> • Version available for panel mounting (control panel) or wall mounting • Wall mounting with cable entry from the back Technical description: <ul style="list-style-type: none"> • 6 backlit function keys • Backlit semi-graphical LCD, resolution 132 x 64 pixel • User guidance with plain text display and user prompts • Plain text display and flashing LED to indicate faults • Power supply via air conditioning and ventilation module KLM or external supply (18 – 30 V DC) • RS485 (pLAN) interface • IP rating IP65 (panel mounting), IP40 (wall mounting) • The following functions can be selected: <ul style="list-style-type: none"> • Preheat program, night ventilation, enable weather-compensated operation (heating/cooling), summer compensation, backup mode (heating/cooling), extension of operating time, pressure/flow rate control, intermittent ventilation, electric heating bank switching, • natural cooling, air quality control, heat recovery control, heat source demand, cooling source demand (2-stage), fire damper function, frost protection, external demand, anti-seizing protection for pumps and valves, pressure and airflow control prompts <ul style="list-style-type: none"> • Setting of switching times for day mode/night mode/off/backup mode for each weekday • Activation of a holiday program • Dimensions: 156 x 82 x 30 mm (panel mounting) 156 x 82 x 31 mm (wall mounting) Delivery: BMK programming module mounted on control panel (optional: loose, as remote control) KLM air conditioning and ventilation module mounted in the control panel <ul style="list-style-type: none"> • Power supply 24 V AC or 28 – 36 VDC • Connections via plug-in connector, max. 2.5 mm² • RS485 (pLAN) interface • Dimensions: 315 x 110 x 60 mm • Installation on DIN rail Version <ul style="list-style-type: none"> • 14 digital inputs 24 V AC/DC • 4 digital inputs 24 V AC/DC or 230 V • 6 universal analogue inputs (0 – 10 V, 0 – 1 V, 4 – 20 mA, 0 – 20 mA, 0 – 5 V ratio-metric, NTC10k, NTC5k) • 4 passive analogue inputs (NTC10k, NTC5k, PT1000) • 6 analogue outputs (0 – 10 V) • 13 digital outputs (relay outputs, single pole) • 5 digital outputs (relay outputs, changeover) 		

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		Control accessories		
		Indoor air quality sensor Air quality sensor as control variable for control; plug-in design.		
		CO₂ sensor as control variable for CO ₂ -dependent control; plug-in design.		
		Room temperature sensor, loose; as control variable for room temperature-dependent control.		
		Outside temperature sensor, loose; as control variable for extract air-dependent control.		
		LON – Interface module for WRS-K for fitting on the controller		
		BacNet – Interface module for WRS-K for fitting on the controller		
		Ethernet – Interface module for WRS-K for fitting on the controller		
		Modbus – Interface module for WRS-K for fitting on the controller		
		Fernbedienung BMK-F für Wandmontage		
		Special unit design		
		Supply air control with supply air temperature control		
		Supply air control with room temperature control Exhaust air sensor fitted inside the unit or room temperature sensor loose		
		Konstantdruckregelung mit Zulufttemperaturregelung		
		Constant pressure control with supply air temperature control Exhaust air sensor fitted inside the unit or room temperature sensor loose		



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