

» AIR TREATMENT

CAIRplus SX

CAIRplus[®] SX

» MODULAR CONFIGURATION WITH HIGHLY EFFICIENT ENERGY RECOVERY





Economy and ecology in focus

The signs of the times are unmistakable

Investors, plant engineers, planners, and architects no longer ask “whether” but “how” they can enhance the degree of sustainability of their plants and building management systems. Each building is unique. Its location, size, construction quality, and increasingly the building management system determine its value and profit. The energy state of a building has gained appreciably in significance here: it is a fact that buildings consume around 40 percent of the world’s energy, and produce 21 percent of global greenhouse-gas emissions. The proportion of the energy costs in the “second rent” for users and residents is constantly increasing.

Where the heating, cooling, cleaning, purification, humidification and dehumidification of air are required, FläktGroup makes its contribution to progress. Customised climate control and air treatment, with the maximum-possible reduction in energy consumption over the entire life cycle of the facilities: this all pays out handsomely in euros and cents, in comfort, and in staff productivity. Our solutions reliably comply with all international standards in highly sensitive areas such as hospitals and cleanroom applications. They likewise set new standards for sustainability and flawless system integration in advanced sports arenas, production facilities, airport buildings, and swimming pools – as well as in offices, museums, and hotels.

Technical Quality

The one who processes air must master it

It is due to the precision work that has gone into the development of the hardware and software that our air treatment can neither be seen nor be heard, provides pleasant experience and helps in avoiding wastage of energy and money.

Can a building with large glazed areas be heated during spring and autumn on its north side and cooled on its south side, with only one system and without having to switch on the central heating? Does a system used, e.g., for heating cooling, humidification and dehumidification in pharmaceutical or electronic industry also protect against dirt and bacteria? Can investors and building owners calculate the life cycle costs of a central plant air handling unit, determine the effect of an energy-saving equipment on the operating cost for this purpose and thus select the optimal efficiency class right in the configuration stage of the plant?

FläktGroup has found answers to these and many other questions concerning air treatment and climate control – and has implemented them in solutions which reflect its experience gained in many and various successful applications. The core proposal consists of a broad spectrum of central and decentral air treatment plants, separators and filter plants up to complete clean-room systems. Their function, control and design can be fine tuned to their task, the condition and infrastructure of buildings, the operating cost calculations and the highest standards of energy efficiency and climate protection. State-of-the-art control technology developed in-house permits the individual control in individual rooms just as it permits the central handling in the context of building management system.

Control unit, which has interfaces to all usual systems of the building automation, provide for the trouble-free integration of the devices into the building management system. The fact that planners and users can implement their own desires at the design stage of the plant itself is the proof of the precision work involved in the air conditioning equipment.

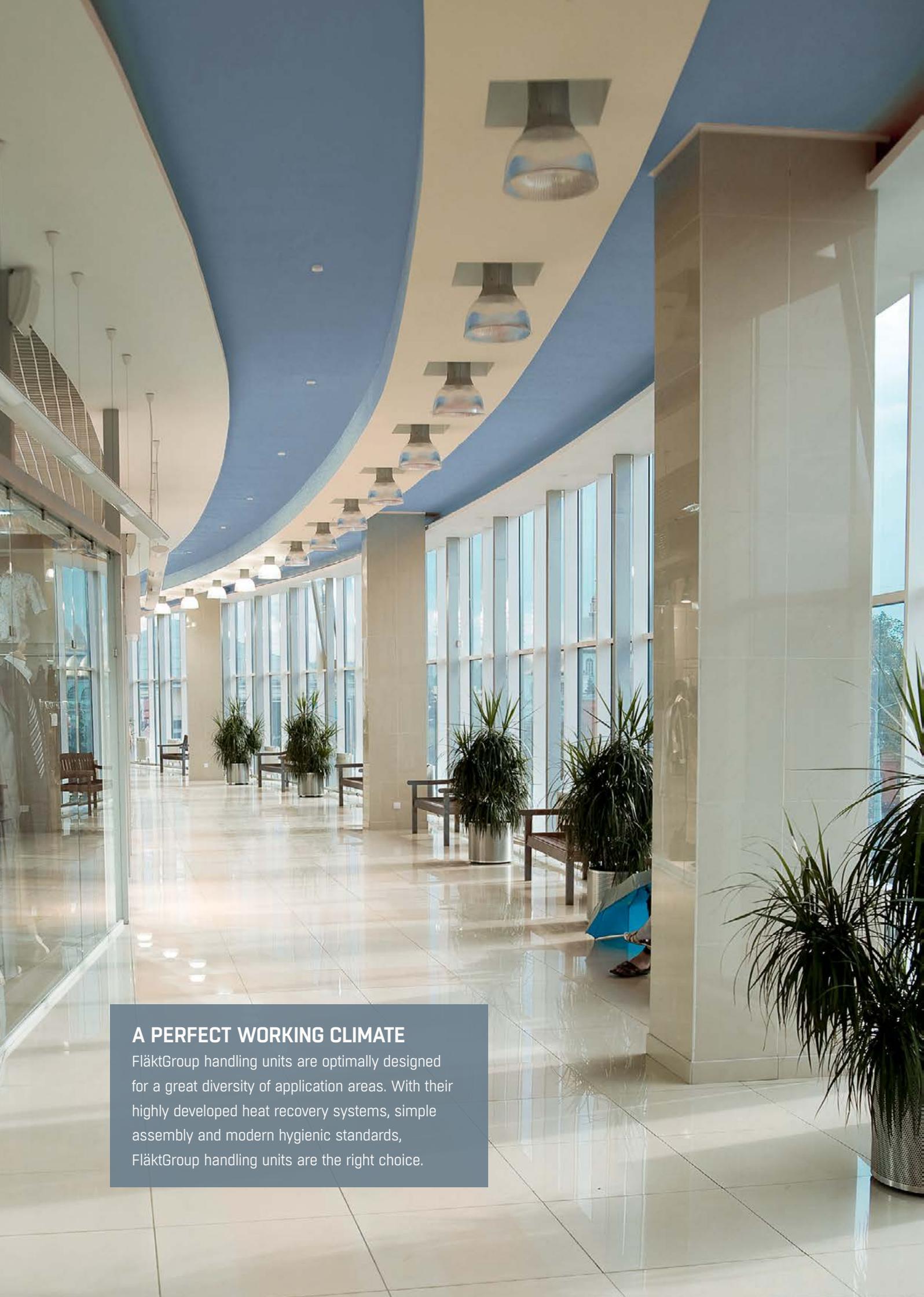
FläktGroup stands for:

- Tailor-made air quality and a healthy, comfortable room climate with extremely noiseless operation
- Maximum energy efficiency and reduction in the CO₂ emission
- Precise central and decentral control and regulation
- High adaptability to most diverse functions and environments
- Easy system integration
- Durability and high degree of availability at low maintenance costs



FläktGroup
Software *Lplus*
Range: CAIR Certification Diploma N°: 07.02.469



A wide-angle photograph of a modern office lobby. The ceiling is a striking feature, with a large, curved section painted in a vibrant blue color, contrasting with the white ceiling elsewhere. Several modern, cylindrical pendant lights hang from the ceiling. The floor is made of large, light-colored tiles that reflect the ambient light. Large windows on the right side of the lobby provide a view of the outside world. Several potted plants are placed throughout the space, adding a touch of greenery. In the background, there are wooden benches and a person sitting on the floor. The overall atmosphere is clean, bright, and professional.

A PERFECT WORKING CLIMATE

FläktGroup handling units are optimally designed for a great diversity of application areas. With their highly developed heat recovery systems, simple assembly and modern hygienic standards, FläktGroup handling units are the right choice.

With modular configuration – and **virtually unlimited possibilities**

When room air lies within the narrow range of optimal indoor comfort temperatures, we feel at ease. This applies not only for home applications, but also for production, office, and sales rooms.

Indoor room climate is influenced by many factors: the number of persons in the room, the number of computers, the lighting, and many other parameters. This is why central air handling is so important for closed rooms. But climate also plays an essential role in production processes. Good HVAC conditions must prevail, for example, in the food and beverage industry. In hospitals and in the pharmaceutical industry, hygiene also plays a critical role.

FläktGroup central air handling units implement heating, cooling, humidifying and dehumidifying, filtering, and cost-effective energy recuperation. FläktGroup is constantly working to improve the quality and engineering of these functions. One result is the new generation of central air handling units: CAIRplus

Whether in new buildings or in the modernization of existing facilities, central air handling solutions can be optimally planned and designed with CAIRplus. The various models can be flexibly selected and matched to any requirements, and dimensioned by means of FläktGroup planning software. At FläktGroup, these efforts focus is on quality and innovative: ensured by constant inspection, further development, and maintenance of state-of-the-art production processes.

Not the acquisition, but rather the operating costs over the entire lifetime constitutes the greatest share of the costs of a central air-handling unit. For this reason, the CAIRplus units can be economically equipped with high-efficiency energy recuperation and energy-saving drive systems. The EU guidelines, which define minimum standards for electric motors and fans, are not only satisfied, but in some cases far exceeded. The certifications according to Eurovent and the German Association of HVAC Manufacturers assure greater transparency and safety.

In addition, completely smooth inner surfaces and good access to all components guarantee high hygienic standards. FläktGroup regularly monitors the currently valid official regulations and assures that they are being met.

Apart from the installed components, additional space for piping and cable runs is available, while the large access doors considerably alleviate maintenance and service work. All door locks, screw connectors and hinges are directly integrated in the unit frame so that even separation joints require no additional space. If needed, individual parts can be easily installed at the construction site from the outside. Shipping to an installation site for the delivery of units up to 1,500 kg is carried out easily and simply with the lifting lugs on the upper side.



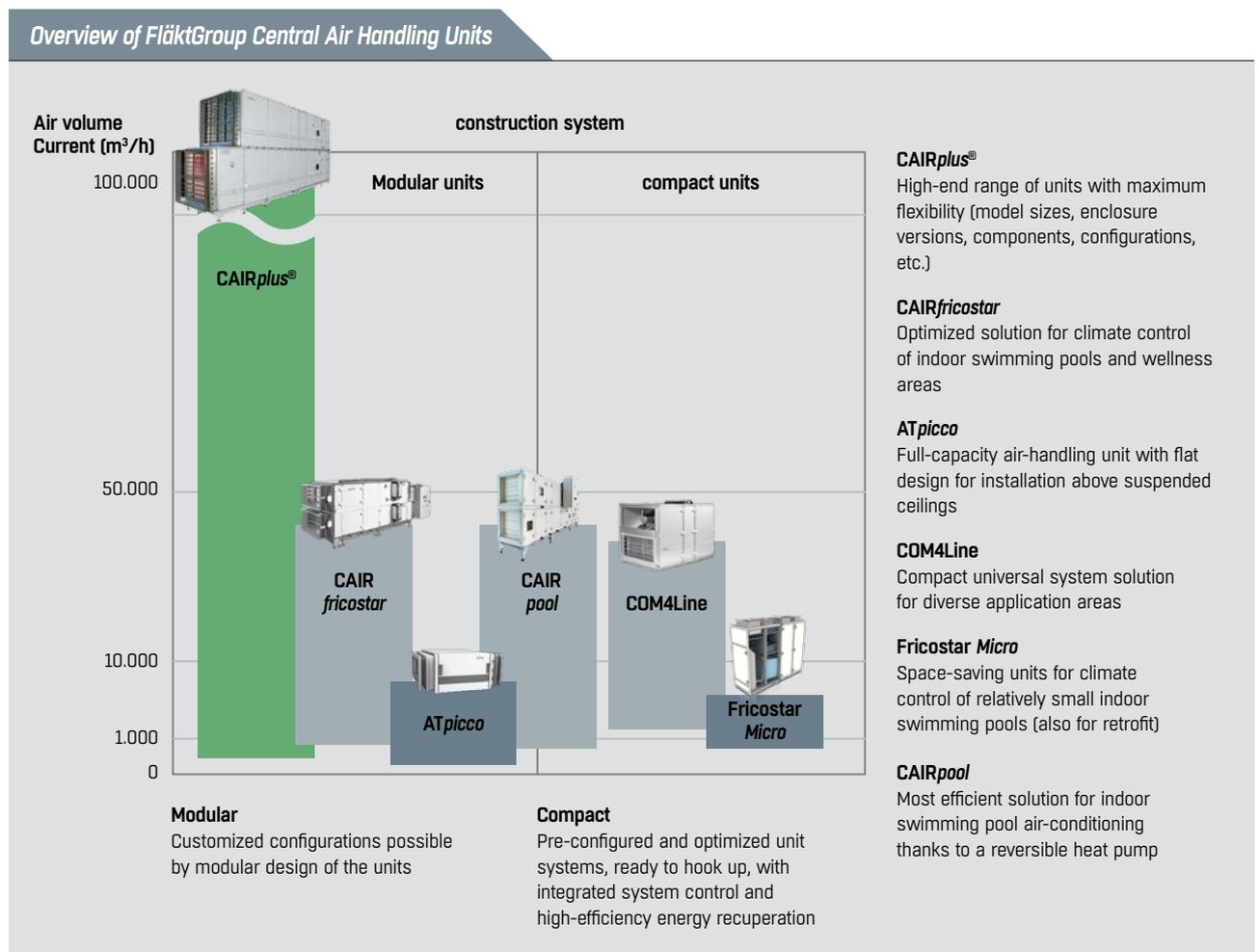
Your advantages:

- All positioning variants are available: indoor and outdoor versions, vertical or horizontal installation – as well as configurations with units on top of each other, behind each other, or next to each other.
- Highest energy efficiency through modern heat recovery systems
- Simple installation and maintenance
- High hygiene standards
- Certified according to Eurovent and AC Manufacturing Association

Optimized for all applications

Air handling units

Project requirements do not always repeat themselves: with its especially designed product ranges, FläktGroup can satisfy practically every demand. For some applications, only the exchange of air is required; however other applications have more sophisticated requirements with respect to temperature, humidity and air purity. Modular units allow the free selection of components and functions and can be adapted to the specific requirements down to the smallest detail. Compact units are optimized for their applications, with high-efficiency energy recuperation. They are delivered wired and ready for connection, with integrated control systems.





Eurovent and the German Association of HVAC Manufacturers

Measuring means knowing.

And the customers get exactly what they expect. This is the motto of the "Eurovent Certification Program". As a result, documentation and software are subjected to strict tests. The EN 13053 and EN 1886 Directives stipulate the criteria to be applied in these tests. Independent testing institutions periodically inspect these characteristics in accordance with Eurovent certification stipulations.

Modelbox Test – enclosure properties in accordance with EN 1886

Enclosures are provided to an independent testing institution every 6 years, which tests these enclosures in accordance with the following properties:

- Mechanical stability (D1 ... D3)
- Enclosure leakage (L1 ... L3)
- Filter-bypass leakage (G1 ... F9)
- Thermal insulation (T1 ... T5)
- Thermal-bridge factor (TB1 ... TB5)
- Sound insulation of the enclosure.

Real Unit Test – software performance characteristics as per EN 13053

In these tests, an independent expert selects one unit type every 3 years at the manufacturer's plant. This type is then exactly manufactured as a specimen copy, measured by a testing institute, and compared to the software data.

The manufacturer's software is then certified only if all the performance characteristics of the copy are successfully verified. The following performance data are tested:

- Mechanical stability
- Enclosure leakage
- Filter-bypass leakage
- Air flow rate
- Available static pressure
- Power consumption
- Noise emitted from the enclosure
- Noise transmitted by the air flow
- Heating capacity
- Cooling capacity
- Degree of energy recovery
- Water side pressure drop

Inspection of the production plants

An independent expert annually visits the production plants of the certified manufacturer. The inspection must verify the conformity of the produced unit with the configuration software.



HVAC systems by FläktGroup satisfy the most stringent of quality requirements and are subjected to periodic testing.



Certified efficiency – energetic certification

Consumption by HVAC systems represents a major share of the energy used by buildings. To reduce this consumption and, in turn, CO₂ emissions, measures are being taken in many countries to increase the efficiency of HVAC systems. But how it is possible to objectively assess energy efficiency on the basis of simple characteristic values?

The Eurovent energy label

Analysis of these factors is summarized in Eurovent efficiency classes A+ to <D, with A+ standing for the greatest efficiency. The basis of evaluation is EN 13053, which assigns various classes to the effect factors of air speed, efficiency of air movement, energyrecuperation efficiency, and pressure drop of energy recuperation. In addition, the Eurovent system considers the climate conditions at the site. In cold climate regions, the use of an efficient energy-recuperation system has a higher rating value than in warm regions. The design temperature for winter operations takes this into account in the calculations. Plants which do not process outdoor air are identified by Eurovent with a separate label A+_C to <D_C. These systems are evaluated only with respect to air speed and efficiency of air movement. There is a trade-off between the individual rating classes. Excessive air velocity can be set off by energy recovery with greater efficiency.

Calculation of the Eurovent energy-efficiency classes

Class		A+	A	B	C	D
Speed						
V_{class}	m/s	1,4	1,6	1,8	2	2,2
Energy recovery						
η_{class}	%	83	78	73	68	63
Δp_{class}	Pa	250	230	210	190	170
Fan power consumption						
NG_{ref}		64	62	60	57	52

RLT – German Association of HVAC Manufacturers

In addition, efficiency classes A+, A, and B are awarded as per the stipulations of this association. Equipment that fails to satisfy these requirements does not receive a classification. Criteria of one class are considered to be satisfied only if all conditions are met.

Numerous factors influence the energy consumption of a central air-handling unit:

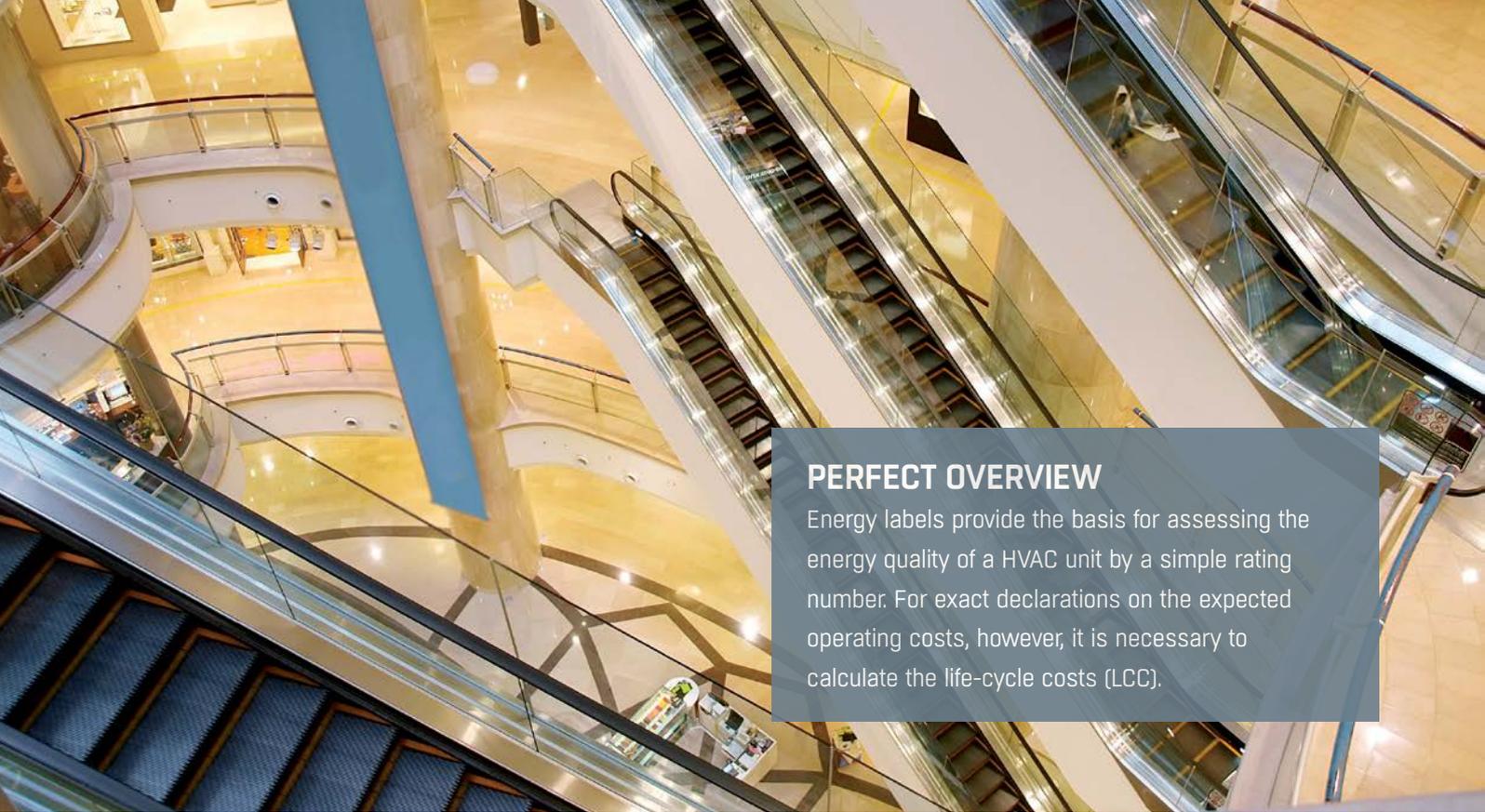
- The air speed in the unit
- The power consumption of the motors
- The efficiency and the pressure drop of the energy recovery
- Climate conditions at the installation site



Eurovent assigns energy efficiency ratings from A+ to <D whereby units with the label A+ show the greatest efficiency.



The German Association of HVAC Manufacturers awards efficiency labels A+, A, and B. Systems that do not satisfy all requirements do not receive a label.



PERFECT OVERVIEW

Energy labels provide the basis for assessing the energy quality of a HVAC unit by a simple rating number. For exact declarations on the expected operating costs, however, it is necessary to calculate the life-cycle costs (LCC).

Consideration of all costs in advance

Life cycle cost calculation

“LCC Guidelines for Air Handling Units” published by Eurovent provide the basis for this calculation. These guidelines are provided in accordance with DIN V18599-3 and VDI 2067-1. The calculation is based on the climate conditions at the equipment site, as well as on operating times. Building behavior is simulated by scenarios that select the supply and extract-air temperatures as a function of outdoor-air conditions. Further influencing variables such as energy prices, investment costs, and costs for maintenance and servicing round out the basis for calculation. Further influencing variables such as energy prices, investment costs, and costs for maintenance and servicing round out the basis for calculation.

Several equipment configurations can be calculated in parallel and compared to each other. The result is a presentation that – in addition to costs of the individual energy media – also indicates the total costs accruing throughout the life cycle under consideration.

46%

Fan energy costs

15%

Investments

10%

Maintenance

2%

Pump energy costs

27%

Energy costs

Heating, cooling, humidifying



LIFE CYCLE COSTS

Investment costs	Energy costs	Maintenance	Disposal
<ul style="list-style-type: none"> Planning Acquisition Installation 	<ul style="list-style-type: none"> Current Heat/cold Water 	<ul style="list-style-type: none"> Maintenance and Cleaning Repairs 	<ul style="list-style-type: none"> Disassembly Recycling and disposal

For fast and reliable engineering design **Lplus configuration software**

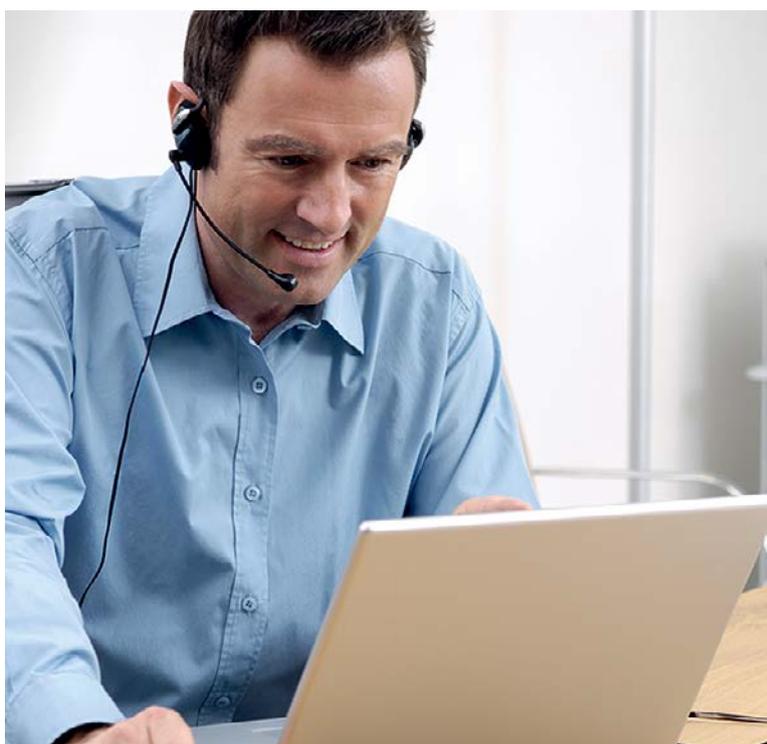
CAIR*plus* central air handling units are characterized by their great diversity of models, which provide a tailored solution for every requirement and building situation. Each unit is individually designed with the configuration software FläktGroup *Lplus*.

Time is money. This especially applies to the project engineering of HVAC facilities. In order for you to determine the selection and configuration of the suitable central air handling unit for your needs as easily and rapidly as possible, we have developed the FläktGroup *Lplus* configuration software.

CAIR*plus* precision climate-control systems have the advantage that all products can be designed to meet individual requirements. The FläktGroup *Lplus* design software helps you to implement your desired system in no time at all. Configuration proposals are generated according to your inputs. Component unit spacing, configuration of the modules as well as weights and measures are immediately determined and shown by *Lplus*. You can't really plan faster than that, and at the same time more reliably! This means that you gain valuable time for other tasks.

Advantages of the FläktGroup *Lplus* configuration software

- Individual configuration suggestions
- Determination and display of unit sub-divisions, modular configurations, dimensions, and weights
- Calculation of life-cycle costs (LCC)
- Simple program handling
- Fast, reliable selections and planning
- Valuable time gain for other tasks
- Specification of energy efficiency classes (Eurovent and HVAC Manufacturers)
- Calculation methods regularly examined by Eurovent

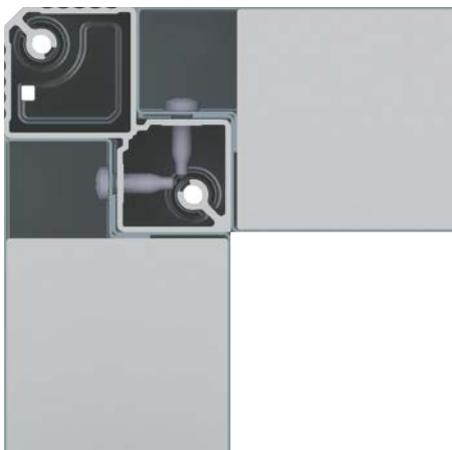


FläktGroup *Lplus* design software covers all products by FläktGroup. The free full version can be downloaded from the internet (www.flaktgroup.com) or requested from us.

HYGIENE-TESTED HVAC SYSTEMS



3D drain pan



The housing interior of the CAIRplus central air handling unit is completely smooth and thereby easy to clean. This creates optimal prerequisites for hygienic operation according to VDI 6022, VDI 3803 and DIN 1946 part 4.

Great emphasis is placed on a hygienically appropriate construction in the design and structure of the CAIRplus central air handling units. CAIRplus units are entirely smooth on the inside. There are no edges or threaded connections to restrict complete cleaning of the unit.

For stricter hygiene standards – for example, in buildings and rooms of public health institutions – additional requirements must be satisfied as described in DIN 1946, Part 4. CAIRplus central air handling systems satisfy these requirements as well. These requirements are also satisfied by the CAIRplus air handling units.

Hygiene requirements applicable to HVAC equipment are stipulated in the following standards and guidelines:

- VDI 6022 Page 1 Hygiene requirements placed on HVAC systems and units
- EN 1886 mechanical properties and measurement techniques
- EN 13053 performance indicators
- DIN EN 13779 general fundamentals and requirements
- DIN 1946 Part 4 HVAC systems in hospitals

Everything from one source

Integrated cooling

CAIR^{plus} central air handling units with integrated cooling systems are virtually entirely ready for connection, and their components have been optimally coordinated with each other. They are distinguished by their integrated control technology and highly efficient energy recovery.

DX direct evaporator technology with R134a refrigerant achieves high levels of reliability and long service life. These systems are also absolutely reliable in service, even under conditions of high outdoor temperatures. Their output can be continuously matched to momentary cooling requirements. For minimized energy consumption, FläktGroup also offers the option of adiabatic evaporative cooling. All cooling components and the control system have been integrated in the unit.

The refrigeration circuit

- Heat exchanger as direct evaporator and refrigerant condenser
- Semi-hermetic compressor (reciprocating piston compressor up to 100 kW cooling capacity, with screw compressor for greater requirements)
- Output control by means of cylinder shut-off and frequency converter
- Control range from 30 to 100% of the maximum cooling capacity (optional: 10 to 100%)

The control system

- Control cabinet integrated into the unit and completely wired
- Control by ISYteq
- Optional bus interface
- As alternative, available in an external switch box



Overview of the integrated cooling technology

- Great number and variety of application areas: e.g., in offices, supermarkets and department stores
- Small footprint
- Everything from one source
- No external piping
- Little engineering effort
- Simple installation
- Great energy efficiency, since the system is always connected to energy recuperation
- For air flow from 3.000 to 50.000 m³/h
- For indoor and outdoor installation
- Optional adiabatic extract-air humidification
- Control by FläktGroup ISYteq
- Project-specific solutions are possible

AIR HANDLING CONFORMITY WITH ATEX



With its products for numerous applications, FläktGroup provides the necessary safety for explosion-endangered areas. FläktGroup central air handling units represent a significant element here. Their many and various functions provide the basis of fully functional HVAC systems for application in explosionendangered zones.

Explosion groups

Classification of the amount of energy required to ignite substance-dependent quantities and volumes

- IIA = a great amount of energy
- IIB = a moderate amount of energy
- IIC = a small amount of energy

An atmosphere can be explosive as a result of local conditions and/or operational circumstances. Such specific conditions involve mixtures of air and combustible gas, vapor, mist, or dust. For an explosion of these substances, atmospheric conditions are necessary under which the process of combustion – after successful ignition – spreads to the entire non-combusted mixture. Explosionendangered areas can develop where explosive gases, mist, vapor, or dust exist or could form. Areas in which hazardous, explosive atmospheres can exist are classified by zones according to the probability of occurrence of hazardous atmospheres.

Classification into zones

Danger of explosion	Example	Gasses	Dusts	Required category
An explosive atmosphere is always, long-term, or frequently present	Inside the containers	Zone 0	Zone 20	1
An explosive atmosphere is sometimes present	In the area of filling and emptying openings	Zone 1	Zone 21	2
An explosive atmosphere is rare and then also only temporary	Ranges around the zone 1/21	Zone 2	Zone 22	3

Breakdown into temperature classes

Temperature class		T1	T2	T3	T4	T5	T6
Ignition temperature of the combustible substances greater than	°C	450	300	200	135	100	85
Maximum permissible surface temperature of equipment	°C	450	300	200	135	100	85



HIGHEST SAFETY

All operators of facilities with the possibility of formation of explosive atmospheres are required to classify their plants by zone: either themselves, or with the aid of a consulting company, in accordance with ATEX 137 (Guideline 1999/92/EG) and its national laws and ordinances.

The operator must also observe the fundamental measures for primary protection against explosions with “avoidance of explosive atmospheres”: e.g., by means of dilution, limiting, substitution of substances, or the like. A ventilation or climate-control unit as individual component cannot alone guarantee complete and comprehensive explosion protection, since the protective concept must cover the entire facility. The overall responsibility therefore ultimately lies with the user or the contractor.

ATEX conformity certification of FläktGroup

Guideline 94/9/EG – better known as ATEX 95 – contains the stipulations for “equipment and protective systems for application in explosion-endangered areas in conformity with the relevant stipulations.” FläktGroup delivers CAIRplus for use in explosion-endangered areas in accordance and conformity with ATEX Guideline 94/9/EG (ATEX 95).

Equipment classification in accordance with ATEX

Example: Ex II 3 G IIB T4 interior

- II
Equipment Group (I = mining; II = all other areas of application)
- 3
Category (3 for Zones 2, 22; 2 for Zones 1, 2, 21, 22; 1 for all zones)
- G
G = gas; D = dust
- IIB
explosion Group
- T4
Temperature class
- Interior
Inside the equipment (if no indication given, then for inside and outside)

ATEX Conformity Certification for FläktGroup

Gas Ex application	Dust Ex application
II 3 G IIB T3 interior	II 3 D T200 °C interior
II 3 G IIB T4 interior	II 2 D T200 °C interior
II 2 G IIB T3	
II 2 G IIB T4	

ATEX Conformity Certification has been provided for the applications to the left:



INNOVATIVE TECHNOLOGY WITH INTUITIVE USER CONTROL

CAIR*plus* air handling units are characterized by great diversity of models, which provide a tailored solution for every requirement and building situation. Every unit is individually equipped with the matching ISYteq control system.

The control system ISYteq unites innovative technology with simple operation. The Comfort not only makes uncomplicated and time-saving commissioning noticeable, but also the intuitive handling. The CAIR*plus* air-handling units with their optimized components and pre-configured control system leave the factory with a reliable and suitable equipment state to the satisfaction of every customer.

The control system acquires a wide range of measured values and continuously monitors them, to assure safe and reliable operation of CAIR*plus*. If one of the monitoring systems responds, this is displayed by colour marked signalization and in plain text by the touchscreen.

**Just the
right turn**
for the right
room
climate



Easy & Intuitive Handling

- Change temperatures
- Change fan settings
- Change own profiles
- Complete settings in calendar
- Track historic Trend Data
- Alarm Management



Flexible connection and system integration

- Plug-and-play functionality
- BACnet and Modbus on Bord
- On Board Web Server (connection via PC/Smart devices)
- Several digital and analogue interface function for all customer requirements
- Ethernet ports
- RS485 Port
- Remote access
- Universal channels
- USB stick connection

Full graphic visualization of the units and functions

The user can access all important functions through the operator level on the new attractive 7" touch display. The operating state is visualized by the current system information by, for example, sensors, signal or setpoint values. Trending graphs and displays show operating cycles in a linear diagram. This allows to easily optimize the system at any time.

Integrated or external

Depending on the unit type and customers' wishes, both variants are available: either as compact switch cabinet or ready-for-connection integrated into the unit. All central-plant air handling units can be equipped with the ISYteq control system. This enables an easy linking between all units. By using the control panel display as well as other smart devices, the current installation parameters and settings can be viewed and changed.

Quick commissioning

The components of the ISYteq compact-system controls are completely tested for correct functionality before delivery. The desired configurations are preset as much as possible. The electrical connections are plugged for simple and fast assembly by others on site. Colour designations additionally help to prevent confusion. The remaining connections are provided by a clearly designated terminal block.



All
central-plant
air handling units
can be equipped with
the ISYteq control
system.

The ISYteq controls enables to regulate all components and modules of the CAIRplus air handling units: the user enjoys many functions to operate the CAIRplus.



Temperature/air flow/
pressure control system



Heating with Pumped Warm Water (PWW), electric heating, frost protection air and water-side, cooling with Pumped Chilled Water (PCW), evaporator/condensing unit



Humidity control



Monitoring function



Energy recovery



Communication and connection
to Modbus and BACnet



Energy-optimized mixed
air damper control system



Web server - ISYteq-WEB

Every FläktGroup unit with an ISYteq control board comes furnished with a full-graphics multilingual visual display system. This visualisation is provided with the integrated web server and can be accessed either via a PC with an Internet browser or other smart devices.

The visualisation allows the following activities:

- Configure and perform settings for the plant
- Monitor and operate the plant
- Change setpoint values
- View the archived measured values
- Display of faults, events, maintenance messages and plant documentation
- Export of archives with messages and measured values for external examination e.g. in Excel
- Back up and loading the plant parameters
- Monitor and pre-set the inputs and outputs.



EASY OPERATION

Modern user interface can be used for PC, tablet or cell phone

FLEXIBLE CONNECTION

Several standard protocols and interfaces for connection to an external building automation system

RELIABILITY

Longevity and high availability

High adaptability

System adapts to environments and tasks

EXACT CONTROL AND REGULATION

Centrally and decentrally

RAPID COMMISSIONING

Delivered pre-assembled, wired, pre-set, tested, and commissioned for operation

SIMPLE SYSTEM INTEGRATION

Simple assembly and smooth connection

Control system with numerous monitoring options:

- Pressure-drop measurement for monitoring supply-air and extract-air filters
- Position measurement of the outdoor-air damper, to prevent frost damage
- Temperature measurement to avoid frost, by an additional frost-protection thermostat with a switch-off function
- Icing temperature measurement to protect the direct evaporator
- Monitoring of the safety chain for external compressor-condenser units
- Plausibility check for detection of sensor faults
- Monitoring of malfunction reports from circulation pumps, frequency converters, and energy-recuperation systems

Connection to the building automation system

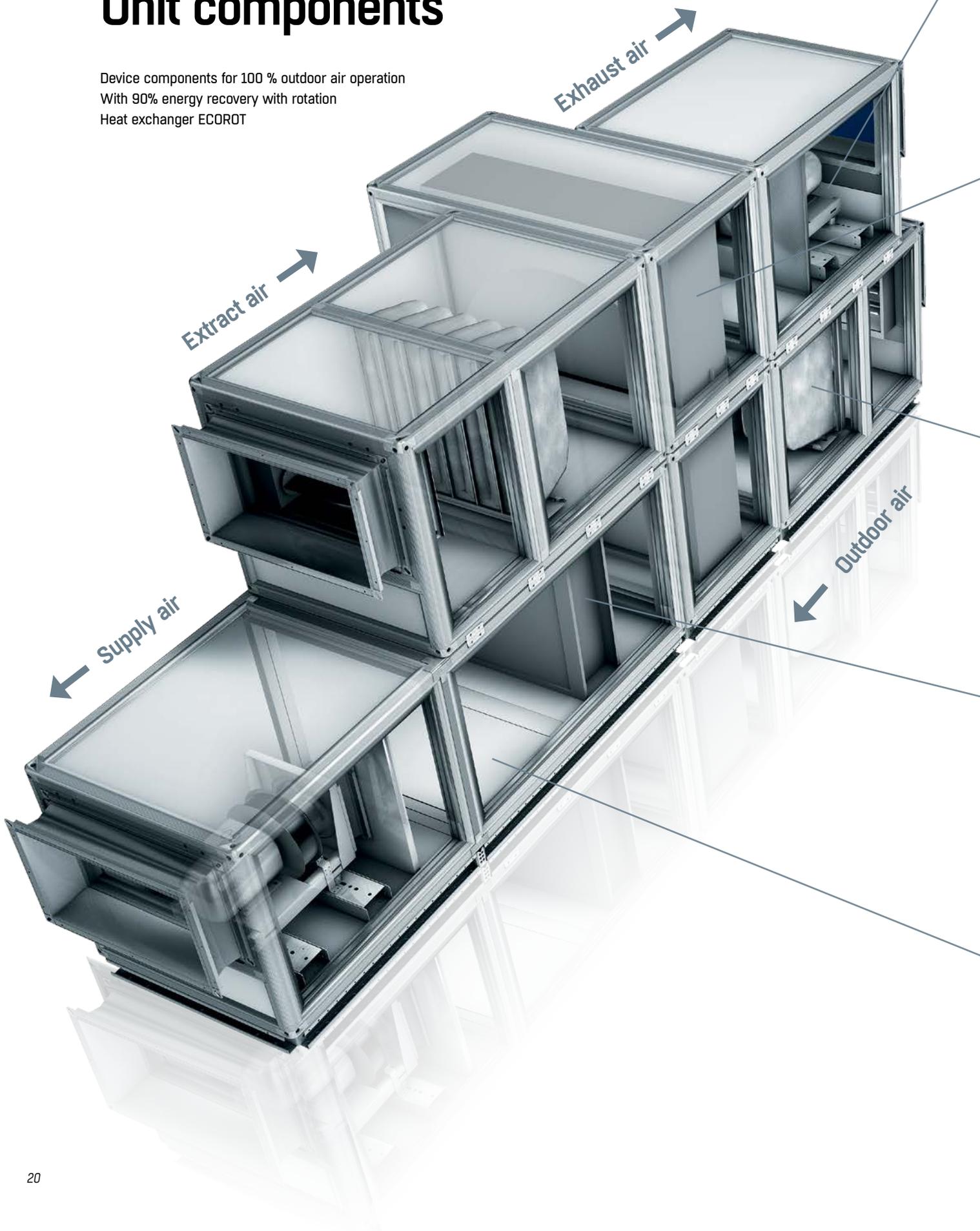
The two interfaces BACnet and Modbus are always on board as standards. This enables the easy and cost-efficient integration in the BMS.

ISYteq



CAIRplus[®] SX Unit components

Device components for 100 % outdoor air operation
With 90% energy recovery with rotation
Heat exchanger ECOROT



Fans



Centriflow 3D plug fan with EC motor



Centrifugal fans Centriflow 3D as "Multi fan"



Centriflow 3D plug fan with AC motor



Centriflow 3D plug fan with PM motor

Energy recovery



ECOFLOW



ECOSTAT



ECOPLAT



ECOTWIN



ECOROT

Air Filters



Pockets



Panel



Cassettes



suspended matter



Grease collector



Activated carbon

Heat Exchanger



Copper



Steel



Smooth pipe



Stainless steel



Electric heating grid

Air humidifier



Humidifier empty part



Electric steam generator



Saturated-steam lance



Evaporation



Spray humidifier

Casing construction and material quality

CAIRplus® SX

Configuration options - routing of airflow - unit profile

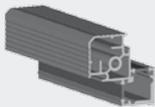
Areas of application: indoor/outdoor installation for horizontal air routing - vertical air routing only for indoor installation



Supply-air and extract-air units.	Model type: horizontal – vertical
Combined supply-air and extract-air units	Model type: in-line – double-deck – side-by-side
Unit width in modular grid	640 mm ... 3,120 mm
Unit height in grid dimension	520 mm ... 3,120 mm
Unit base frame height	80 mm
Unit interior completely smooth as per stipulations in VDI 6022, VDI 3803, and DIN 1946 (Part 4)	
Special types and special dimensions can be delivered	

Housing frame profile – 60 mm

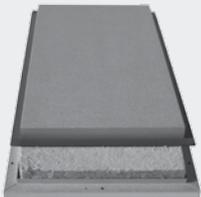
Areas of application: indoor and outdoor installation



Frame profile made of aluminum AlMgSi 0.5
Frame profile made of aluminum AlMgSi 0.5 strip-coated RAL 9002
RAL colors available as per customer's request

Casing panels – 60 mm wall thickness

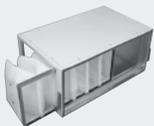
Areas of application: indoor and outdoor installation



Internal skin aluzinc AZ 185 with anti-fingerprint coating as of DIN EN 55928 Part 8 corrosion protection class. III
Internal skin of galvanized metal sheet, strip-coated RAL 9002
Internal skin: stainless steel V2A, material no. 1.4301 or V4A, material no. 1.4571, (AISI304) and (AISI316)
Exterior shell sheet steel galvanized strip coated RAL 9002
RAL colors (but not metallic) available as per customer's request

Material properties of installed components

Areas of application: indoor and outdoor installation



Galvanized metal sheet
Sheet steel galvanized strip-coated RAL 9002, or with high-quality physical properties for increased corrosion protection
Additional corrosion protection as Duplex or Triplex coating

Applications

Areas of application: indoor and outdoor installation



Standard type according to VDI 6022, VDI 3803
Hygienic design according to DIN 1946, Part 4
EEx version for increased safety according to ATEX directive 94/9EG (ATEX 95)
Unit frame with lifting eyes up to 1,500 kg or transportation device for unit base frame for larger loads
Special design versions on request

Casing

CAIRplus® SX

CAIRplus® SX-K | without additional thermal separation

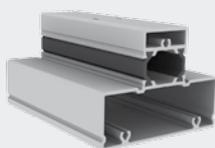
Properties according to prEN 1886 housing wall thickness 60 mm | indoor and outdoor installation - model box data



Test criterion	Unit		Pressure			Limit values		Class	
Mechanical stability	mm/m		-			10		D2	
Leakage	l/s/m²		-400 Pa			0.15		L1	
Leakage	l/s/m²		+700 Pa			0.22		L1	
Filter-Bypass-leakage	%		+400 Pa			0.5		F9	
Thermal insulation	W/m²/K		-			1.0 < U <= 1.4		T2	
Thermal bridging factor	-		-			0.45 <= kb <= 0.60		TB3	
Frequency range	Hz	125	250	500	1000	2000	4000	8000	
Acoustic insulation	dB	20	24	28	25	23	32	34	

CAIRplus® SX-M | with additional thermal separation of the frame profile

Properties according to prEN 1886 housing wall thickness 60 mm | indoor and outdoor installation - model box data



Test criterion	Unit		Pressure			Limit values		Class	
Mechanical stability	mm/m		-			10		D2	
Leakage	l/s/m²		-400 Pa			0.15		L1	
Leakage	l/s/m²		+700 Pa			0.22		L1	
Filter-Bypass-leakage	%		+400 Pa			0,5		F9	
Thermal insulation	W/m²/K		-			1.0 < U <= 1.4		T2	
Thermal bridging factor	-		-			0.60 <= kb <= 0.75		TB2	
Frequency range	Hz	125	250	500	1000	2000	4000	8000	
Acoustic insulation	dB	14	23	30	31	29	29	39	

High-efficiency centrifugal fan Centriflow 3D as "Single plug fan"**Impeller with single intake with a directly integrated EC motor**Operating range 800 ... 15,000 m³/h

Fan blades bent backwards

Capacity control with an integrated controller

Operating range -20 °C ... +40 °C

Efficiency class IE4

High-efficiency centrifugal plug fans Centriflow 3D as "Multi fan"**Impeller with single intake with directly integrated EC motors**Operating range 10,000 ... 100,000 m³/h

Fan blades bent backwards

Capacity control with an integrated controller

Operating range -20 °C ... +40 °C

Efficiency class IE4

High-efficiency centrifugal fans Centriflow 3D as "Plug fan"

Impeller with single intake with a directly flanged AC motor



Operating range 800 ... 100,000 m ³ /h
Single and double arrangement
Fan blades bent backwards
Capacity regulation with a frequency inverter
Operating range -20 °C ... +80 °C
Efficiency class IE3

High-efficiency centrifugal fans Centriflow 3D as "Plug fans"

Impeller with single intake with a directly flanged PM motor



Operating range 800 ... 80,000 m ³ /h
Single and double arrangement
Fan blades bent backwards
Capacity control with a mounted controller
Operating range -20 °C ... +80 °C
Efficiency class IE4

Coarse and fine particle filter as bag filter | Filter quality class DIN EN 779 & ISO 16890

Operating range: filtration of coarse and fine dust particles



EN 779	ISO 16890				Bag length
G4	ePMcoarse	Synthetic fiber		Am 90%	360 mm
M5	ePMcoarse	Synthetic fiber	Em 47%	Am 98%	360 mm
M5	ePM10/55%	Micro-glass fibers	Em 47%	Am 98%	534 mm
F7	ePM2.5/60%	Synthetic fiber	Em 85%	Am 99%	380 mm
F7	ePM1/60%	Micro-glass fibers	Em 85%	Am 99%	534 mm
F9	ePM1/85%	Micro-glass fibers	Em 95%	Am 99%	600 mm

Coarse and fine particle filter as panel filter | Filter quality class DIN EN 779 & ISO 16890

Operating range: filtration of coarse and fine dust particles



EN 779	ISO 16890				Bag length
G4	ePMcoarse	Synthetic fiber		Am 90%	48 mm
M5	ePM2.5/55%	Micro-glass fibers	Em 47%	Am 98%	96 mm
F7	ePM1/50%	Micro-glass fibers	Em 85%	Am 99%	96 mm

Fine particle filter as cassette filter | Filter quality class DIN EN 779 & ISO 16890

Range of application: separation of fine dust particles for minimal space requirements



EN 779	ISO 16890				Bag length
M6	ePM2/55%	Micro-glass fibers	Em 73%	Am 98%	298 mm
F7	ePM1/50%	Micro-glass fibers	Em 86%	Am 99%	298 mm
F9	ePM1/75%	Micro-glass fibers	Em 96%	Am 99%	298 mm

Air Filters

CAIRplus® SX

HEPA filter with a tightness-test groove and tightness-seat tube according to VDI1946 Part 4a | Filter quality class DIN EN 779 & ISO 16890

Range of application: separation of the finest dust particles for hygienic areas				Bag length
	H13	Micro-glass fibers	Am 99,95 %	292 mm

Grease filter as panel filter | Filter quality class Din EN779 & ISO16890

Range of application: separation of fats (no oils)				Bag length
	G3	Aluminum wire mesh	Am 87 %	48 mm

Aktivkohlefilter als Patronenfilter mit Bajonettverschluß | Filter quality class Din EN779 & ISO16890

Range of application: separation of gaseous odors and pollutants				Bag length
		Activated carbon cartridge, 16 pieces 1/1 cell each		450 mm

Heat Exchanger

CAIRplus® SX

Finned tube heat exchanger – series SD 181 ... SD 400 | Copper/aluminum material

Area of application: pumped warm water (PWW), pumped hot water (PHW), pumped cold water (PCW), or refrigerant (R)



- Core copper pipe with attached aluminum, strip-coated aluminum, or copper fins
- Fin interval optimized in accordance with performance requirements: 1.8 ... 4.0 mm
- Frame as chosen: galvanized sheet steel, aluminum, copper, or stainless steel
- Direct evaporator with intake manifold and refrigerant distributor made of copper
- Optional: heat exchanger, complete, dip-coated, for enhanced corrosion protection
- Maximum operating pressure: 45 bar; temperature of medium: 110 °C
- Special versions available as requested

Finned tube heat exchanger – series FE and FV | Materials: steel galvanized FE/stainless steel FV

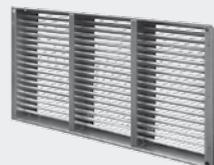
Area of application: pumped warm water (PWW), pumped hot water (PHW), saturated steam, thermo-oil, and pumped cold water (PCW)



- Core pipe with fins galvanized together in dip bath
- Fin interval optimized in accordance with performance requirements: 2.1 ... 6.0 mm
- Frame as chosen: galvanized sheet steel or stainless steel
- Steam heat exchanger with vertically configured core pipes
- Optional: Stainless-steel heat exchanger (FV), material no. 1.4301 or 1.4371
- Maximum operating pressure: 45 bar; temperature of medium: 110 °C
- Special high-pressure version available: 25 bar; with German TÜV certification

Smooth-bore pipe heat exchanger – Series SD000 – Series FE000 – Series FV000 | Copper/steel/stainless steel material

Range of application: unfiltered air currents, filter freezing protection, filter microbe protection, small power requirement



- Properties the same as described for Series SD, FE, or FV, but here without fins
- As freezing protection before the outdoor air filter. By heating = reduction in relative humidity
- As microbial protection before the outdoor air filter. By heating = reduction in relative humidity
- Here, also see VDE 6022, Sheet 1, and DIN 1946, Part 4
- For after-heating with high temperatures of medium, and for low outputs
- Recommended maximum temperature increase: 3 K
- Maximum operating pressure: 16 bar; temperature of medium: 110 °C

Electrical heat exchanger – electrical frost-protection heating – gas-fired heater

Range of application: unfiltered air currents, filter freezing protection, filter microbe protection, small power requirement



- Electrical heat exchanger with max. 100 °C surface temperature on the heating gratings, with safety-thermal cutoff and monitor according to VDE/DIN 57100, VDI 3803
- Electrical-frost protection heating as stand-by heater fitted in unit chambers for the protection of the non frost-safe installation elements in weatherproof units
- Directly natural-gas-fired stainless-steel heat exchanger

Energy recovery

CAIRplus® SX

Multiflow – finned-tube heat exchanger, Series DD, as liquid-coupled energy recovery system (KVS) | Copper/aluminum material

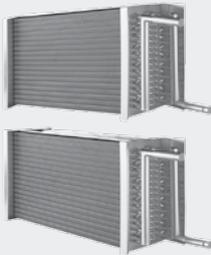
Area of application: operation of separately installed supply-/extract-air units – energy transport via brine circ



Properties as for Series SD heat exchangers	Efficiency factor	up to 78 %
Supply- / extract-air flow 100% separated		
Version with a hydraulic station for fully automatic control and, if necessary, supply of multiple units. Possible to connect heating or/and cooling medium.	Frosting danger in extract-air heat exchanger	yes
	Cooling recuperation	yes
	Humidity recovery	no

ECOFLOW – finned-tube heat exchanger, Series DD, as liquid-coupled energy recovery system (KVS) | Copper/aluminum material

Area of application: operation of separately installed supply-/extract-air units – energy transport via brine circ



Properties as for Series SD heat exchangers	Efficiency factor	approx. 70 %
Supply- / extract-air flow 100% separated		
Optional: Series FE steel heat exchanger		
A frost-protection control system is necessary to prevent frosting of the extract-air heat exchanger; optional with the FläktGroup hydraulics module	Frosting danger in extract-air heat exchanger	yes
	Cooling recuperation	yes
	Humidity recovery	no

Energy recovery

CAIRplus[®] SX

ECOPLAT/ECOTWIN – aluminum plate heat exchanger with integrated bypass louver | Material: aluminum-separating body

Area of application: operation of supply-/extract-air units installed one over the other, or next to each other - energy exchange via aluminum plates



Standard plate exchanger	ECOPLAT	ECOPLAT – efficiency factor	> 73 %
Plate spacing 3.0 ... 12.0 mm		ECOTWIN – efficiency factor	approx. 80 %
Optional: high-performance class			
Double plate exchanger Plate spacing 6.0 ... 12.0 mm, capacity class High Performance, with integrated recirculating-air louvers	ECOTWIN	Frost risk in extract-air heat exchanger A frost-protection control system is required at extract-air humidity of > 45 %	yes
Optional: ECOPLAT / ECOTWIN with surface coating for corrosive environments		Cooling recuperation	yes
		Moisture recovery	no

ECOROT – rotary heat exchanger with 3 optional storage cores | Material: aluminum storage mass

Area of application: operation of supply-/extract-air units installed one over the other, or next to each other - energy exchange via aluminum storage mass



Rotating aluminum storage mass		Efficiency factor	approx. 90 %
Condensation rotor with humidity exchange in event of condensation, optional: epoxy-coated storage material under corrosive conditions		Cooling recuperation	yes
		Moisture recovery	yes
Enthalpy rotor with enhanced moisture exchange especially in case of condensation		Optional: 2 parallel rotors (ECOROT-DUO) configuration of units one behind the other	
Sorption rotor for high transmission of latent heat throughout the entire year		Regulator for continuously variable speed control	

Air humidifier

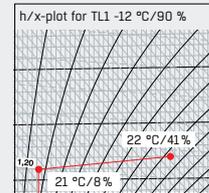
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Electric steam generator | Maximum humidification output: 232 kg/h for electrical connection ratings of 4 x 43.5 kW

Area of application: steam humidification by production and release of pure water vapor, free of minerals



Operation for drinking water	max. steam quantity 232 kg / 1 x 45.0 kW
Maximum steam volume for operation with partially demineralized water	max. steam quantity 232 kg / 4 x 43.5 kW
Steam humidifier for fully automatic production and release of water vapor	
Supply and treatment of water for the unit: from user's mains network	
WATER FEED SOLENOID	
Regenerable steam cylinder	
Electronic control system with microprocessor control	

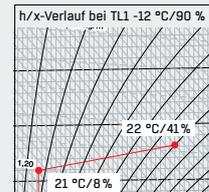


Saturated-steam humidifier for outside steam networks | Maximum humidification output: 451 kg/h of steam at 1.5 bar

Area of application: dry steam humidification via installed saturated-steam lance



Water feed from user's own network
Sparge pipework and steam drier made of stainless steel
Built-in lance heating
ARI valve with 24-volt actuator for 0 ... 10 V actuating signal
Condensate drain in form of ball float

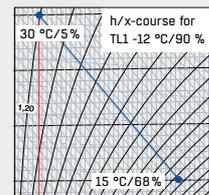


Evaporative humidifier | Maximum efficiency: approx. 65% or 85% (two models)

Area of application: humidification via fresh or recirculated water, by dripping over humidification cassettes



Incoming water feed from user's own network
Operation with completely demineralized (distilled) water not possible
Water-distribution hood and float valve for water feed
Water catch tray and sheet-metal parts made of stainless steel, material no. 1.4301
Non-combustible humidification cassettes made of GLASDek-TM.material

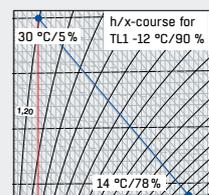


Spray humidifier (air scrubber) | Maximum efficiency: approx. 88%, 92%, or 95% (3 model lengths)

Area of application: humidification with fresh or recirculated water, by spray mist from high-performance aerosol nozzles



Incoming water feed from user's own network via an installed float valve
Operation with completely demineralized (distilled) water is possible
Casing made of glass fiber-reinforced plastic (GRP)
Nozzle block with threaded nozzle-pipe distributors
High-performance aerosol nozzles, self-cleaning and non-clogging
Block pump with 3-phase AC motor
Air rectifier and PPTV droplet separator; temperature durability up to 130 °C



Sound attenuators / blank sections

CAIRplus® SX

Sound-attenuator unit | Sound-attenuation splitters with upper material made of glass-fiber mesh or fleece made of filament glass yarn

	Soundattenuation at	Length mm	600	920	1200	1520	1720	2000	2320
	63 Hz	dB	4	6	7	8	9	9	10
	125 Hz	dB	6	11	17	21	24	28	31
	250 Hz	dB	15	22	27	33	39	45	50
	500 Hz	dB	16	24	32	40	48	50	50
	1000 Hz	dB	18	25	33	41	49	50	50
	2000 Hz	dB	15	20	26	32	38	43	49
	4000 Hz	dB	14	13	16	20	23	27	30
	8000 Hz	dB	14	11	13	16	19	21	24

Empty units/inlet units/maintenance units/operating consoles/multifunctional units with or without damper blades, freely selectable accessibility: with or without service doors or operating cassettes

Lengths of the units in modular grid, as per selection or according to minimum requirements

With louvered dampers installed on the inside or outside

With clamping frame for sensors or thermostats

Lockable access doors; available with crank handles or T-handles

Louvers / Fittings

CAIRplus® SX

*Damper blades for outdoor air, recirculating air, extract air, outgoing air, mixed air
With plastic gear wheels for counter directional operation of the louver blades*

	Louvers / sealing lips in EPDM quality	Material	Leakage as per DIN EN 1751	Class
	Without sealing lips	Sheet steel, galvanized	60 m³/h / m² / 100 Pa	> 1
	Without sealing lips	Stainless steel 1.4301	60 m³/h / m² / 100 Pa	> 1
	With sealing lips	Aluminum	20 m³/h / m² / 100 Pa	> 2
	With sealing lips, airtight as per DIN 1946, Part 4	Sheet steel, galvanized	10 m³/h / m² / 100 Pa	> 3
	With sealing lips, airtight as per DIN 1946, Part 4	Aluminum	10 m³/h / m² / 100 Pa	> 3
	With sealing lips, airtight as per DIN 1946, Part 4	Stainless steel 1.4301	10 m³/h / m² / 100 Pa	> 3
	Special damper blades as per DIN EN 1751, Class 4	On request	5 m³/h / m² / 100 Pa	4

Duct connectors for supply air, outdoor air, extract air, exhaust air

Material properties of the 4-hole profile sections as selected: galvanized sheet steel, galvanized and coated sheet steel, stainless steel



Flexible canvas connections, for sound absorption (PVC fittings)

Hygiene-connection fittings, rigid, for airborne and structure-borne noise attenuation

Both versions are without fixed metal links between the equipment units and the duct connections

First Service Always at your side

Our services at a glance

- Use of certified products and components
- Use of components from well-known component manufacturers
- Short delivery times for spare parts
- Commissioning of new facilities
- Periodic servicing
- Maintenance
- Factory trial run
- Upgrading and optimisation of old facilities
- Maintenance agreements

- Initial installation
- Maintenance and servicing
- Assembly services
- Spare parts
- Customer service
- Consulting
- Refurbishing
- Training





Economical from the beginning

The technical developments of FläktGroup represent state-of-the-art swimming pool climate control. Our systems support diverse applications that optimally conform to current criteria of cost effectiveness, safety and sustainability. Our products and services go far beyond pure technology. They are integrated into a comprehensive and in every respect customised service package. This programme includes not only conventional services such as spare part delivery, maintenance, and repair. It unites the consulting and engineering of a technology leader with customised after-sales service and rapid response times. And this not only for installing new equipment. This service also applies for upgrading and optimising old equipment and provides you with perfect support in all project phases. The functionality of the system is secured over its entire service life.

International service und support in experienced hands

Wherever you need us, we will be there for you in the shortest time. All over Europe, our own customer service ensures that you are able to make optimal use of our units' advantages at all times. Many technicians are ready on-call in Germany alone for rapid deployment. All services are designed for absolute safety and reliability. For example, an on-site function check is a part of our delivery service, conducted by an experienced FläktGroup technician together with the installer. This way we directly and personally pass on our functional know-how built up over many years. In this context we should also mention the training we offer in the technology of our climate control systems. Such training is a beneficial instrument for ensuring the lasting functionality and availability of the systems.

A decision for quality

A high quality standard is the basis and principle for all our services. All our service specialists are highly experienced and devote themselves to their work with great diligence. Technically and personally convincing: this is what you can expect from us.

EXCELLENCE IN SOLUTIONS

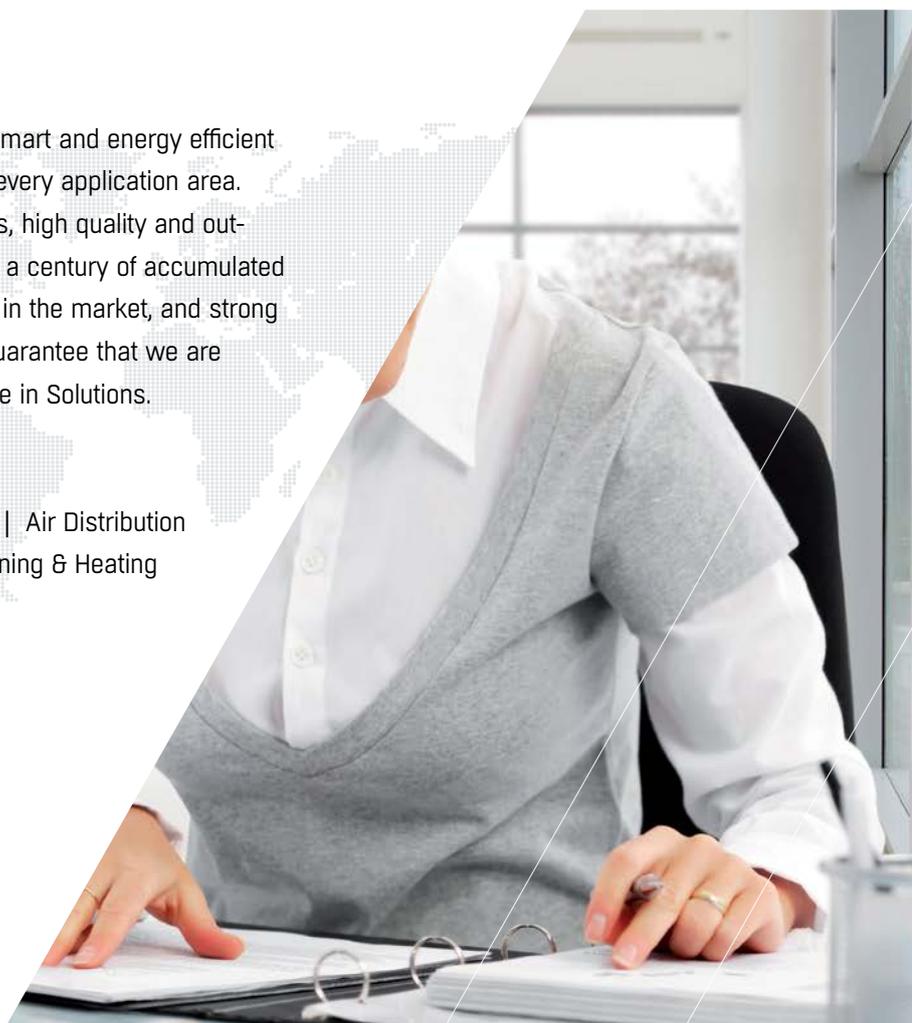
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CAIRplus SX

FläktGroup is the European market leader for smart and energy efficient Indoor Air and Critical Air solutions to support every application area. We offer our customers innovative technologies, high quality and outstanding performance supported by more than a century of accumulated industry experience. The widest product range in the market, and strong market presence in 65 countries worldwide, guarantee that we are always by your side, ready to deliver Excellence in Solutions.

PRODUCT FUNCTIONS BY FLÄKTGROUP

Air Treatment | Air Movement | Air Diffusion | Air Distribution
Air Filtration | Air Management | Air Conditioning & Heating
Controls | Service



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