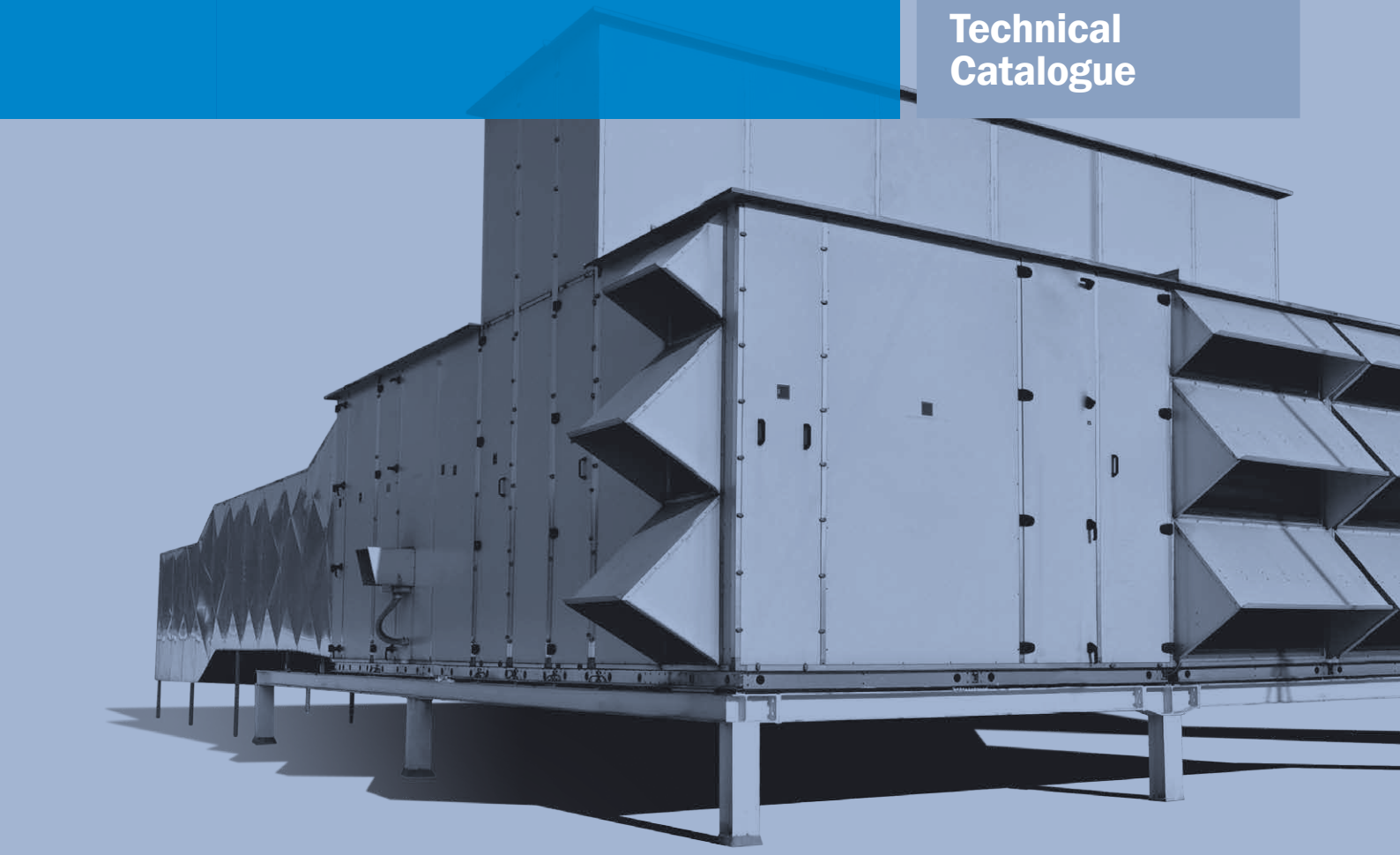
Air handling units

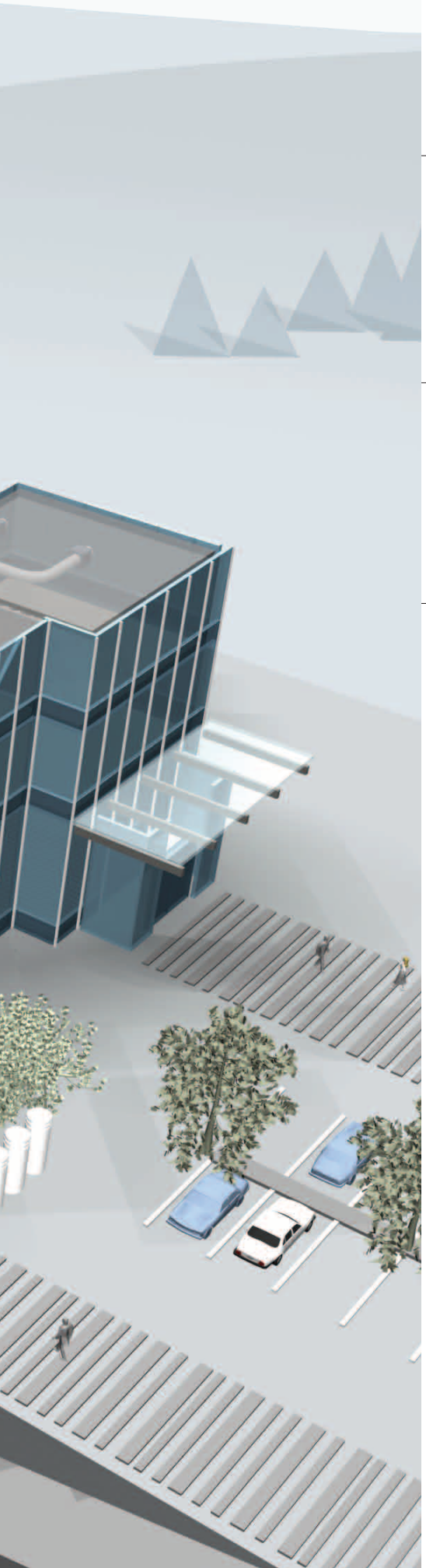
Technical Catalogue



Lindab® IMP Klima

System solutions.

Air handling and energy management systems are becoming an increasingly important factor in ensuring sustainable development of the environment in which we live, because as much as 40 % of all consumed energy in European buildings is converted. Hidria is an international provider of system solutions in the field of air handling, heating and cooling, renewable energy sources and the entire energy management in buildings.



01

Klimair2

TopAir / TopAir Plus

Compact unit
(plug&play)

Air Handling Units

Air handling units are intended for central preparation of air and allow all basic functions, including: heating, cooling, filtration, humidification, dehumidification, heat recovery and regeneration.

Overview

Air handling units

Air handling units are intended for central preparation of air and allow all basic functions, including: heating, cooling, filtration, humidification, dehumidification, heat recovery and regeneration.

There are 38 standard sizes of air handling units available, and they support air volume flow rates of 500 m³/h to 100.000 m³/h. They all boast excellent thermal and sound insulation as well as a custom selection of high efficiency, functional elements.

Types, models

Klimair2

Wall thickness: 50 mm.
Air flow rate: 1.000 – 100.000 m³/h.
Application: interior (KNN), exterior (KZN), for swimming pools (KBN), hygienic (KHN).

TopAir

Wall thickness: 50 mm.
Air flow rate: 1.000 – 100.000 m³/h.
Advantages: new modified range comparing to Klimair2, better design, better fitting, better airtightness.
Application: interior (KNN), exterior (KZN), for swimming pools (KBN), hygienic (KHN).

TopAir Plus

Wall thickness: 50 mm.
Air flow rate: 1.000 – 100.000 m³/h.
Advantages: Advantages: as TopAir, but better thermal bridges class compared to the TopAir and also better thermal transmittance (according to the EN 1886).
Application: interior (KNN), exterior (KZN), for swimming pools (KBN), hygienic (KHN).

Compact units plug&pay

CompAir CF

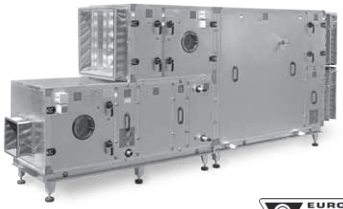
High energy efficiency.
Air flow rate: 500 – 11.000 m³/h.
Within range: Klimair2, TopAir, TopAirP.
Version: indoor, outdoor.

CompAir RW

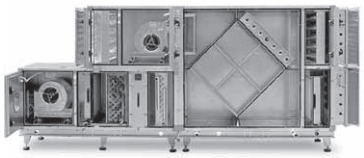
High energy efficiency.
Rotary wheel heat recovery.
Air flow rate: 500 – 11.000 m³/h.
Within range: Klimair2, TopAir, TopAir Plus.
Version: indoor, outdoor.

The Selection Program Aircalc++

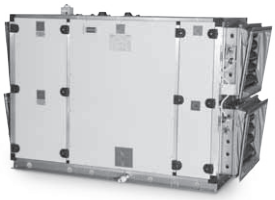
For selecting air handling units, we use the multi-language selection program Aircalc++, which is an excellent tool for sales engineers, project designers of air handling unit systems. Besides calculations, the program also allows you to create sketches that can be exported to AutoCAD, descriptions and the thermodynamic process in the Mollier h x diagram. Software has special module certified according Eurovent and RLT standard.



Klimair2



TopAir / TopAir Plus



Compact unit (plug & play)

Content

General

Advantages of air handling units

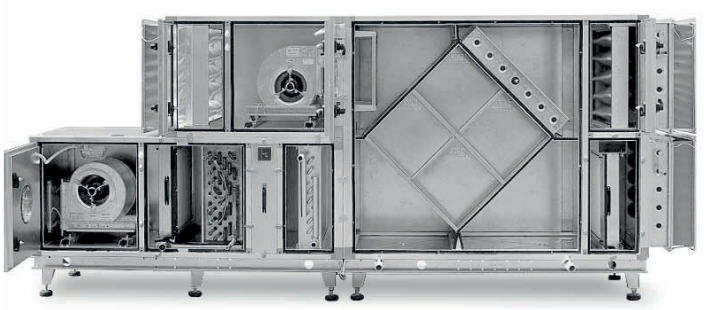
Outstanding flexibility due to adjustable modular construction and a wide selection of air handling unit sizes.
A range of 38 sizes allows a combination of various air handling unit cross section widths and heights. An average of 2 to 3 combinations is available for any nominal volume air flow rate

Wide application range, from 800 m³/h to 100.000 m³/h.
All air handling functions are provided: ventilation, removal of dust, gas, outdoor and microorganisms, heating, cooling, humidification, and dehumidification.

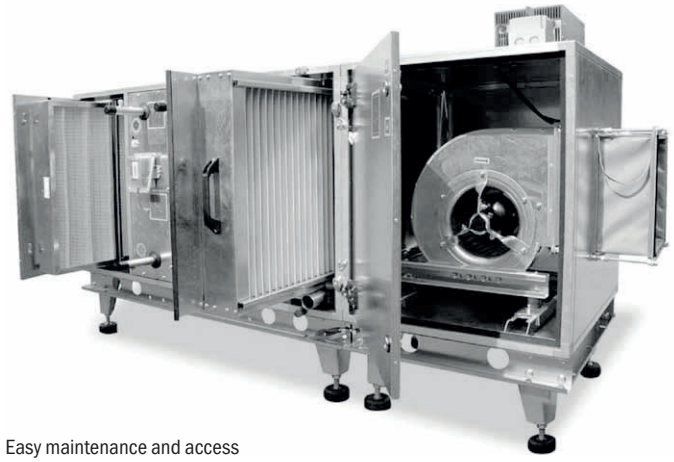
Easy installation due to housing solidity and adaptability to the building entrance conditions, as well as simplicity of interconnection into a set within or outside the housing.
Air handling units can be dismantled into any number of particular compact sets, depending on the number of functional sections, unit size, transport options, and building requirements.

Low energy consumption and low risk of housing condensation due to quality thermal insulation and air-tightness of housing.
Acoustic insulation is made of 50 (25) mm thick rock wool, with fibres oriented vertical to the wall surface. It is non-flammable and it remains stable over time and thus assures the solid housing.

Easy maintenance and access to all components, hygienically-friendly construction.
Internal surfaces of a high quality housing are flat and smooth. Holding components of functional elements have their sharp edges rounded to the extent practicable.



Flexible construction



Easy maintenance and access

Additional anticorrosion powder-coating or use of stainless materials ensure extended service life.
Any combination of steel sheet materials is available.

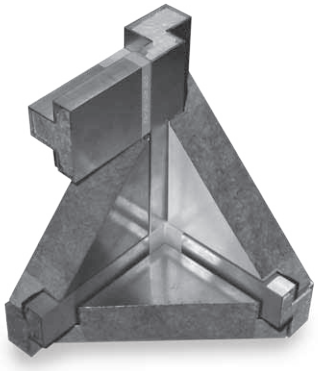
Option to select optimal exhaust air heat or cold recovery system.
- Plate recuperator.
- Double plate recuperator.
- Counterflow plate recuperator.
- Rotary regenerative heat exchanger.
- Fin recuperator.
- Heat pump.

High and constant quality of manufacturing process and products.
Compliance with the European machinery, low-voltage and electromagnetic adequacy directives. Quality of development, construction, production, and customer service in accordance with ISO 9001.

Package solution of air handling unit with integrated cooling hydraulic and control systems.
Air handling units can be fitted with all the control equipment required for its automatic operation. We can provide the start-up of the unit and train the maintenance personnel to handle properly with the unit.

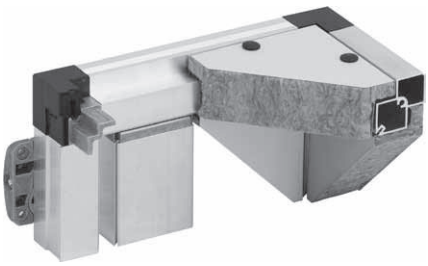
Anticorrosion protection

Different heat recovery systems



Good sound and thermal insulation

Integrated cooling hydraulic system



Housing TopAir

Housing TopAir Plus

Quality

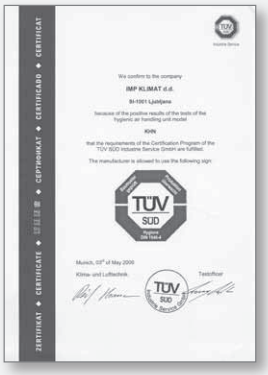
Quality of air handling units is very important, thus we pay a lot of attention to constant improvement of all business processes and products.

- Air handling units comply with the ISO 9001, which is how we guarantee quality in development, construction, manufacturing and sales.
- Air handling units conform with the requirements of the European directives for machinery, low voltage and electromagnetic compatibility.
- We have aquired GOST certificate for all types of air handling units intended for the Russian market.
- For our air handling units, intended for the Russian market, the Sanitary-Epidemiological Conclusion Certificate is available.
- Our hygienic air handling units conform with the norms DIN 1946 -4, EN 3053 and VDI 6022, for which we are TÜV certified.
- Our explosion-proof models are made in conformity with the Directive 94/9/EC (ATEX) i.e. the technical documentation for the air handling units has been proven by the notified body (SIQ Ljubljana).
- The air handling unit Klimair2 aquired a certificate Eurovent (for a housing KNN, KHN and TopAir). Tests for mechanical characteristics and air flow rate were performed according to the norms EN 1886 and EN 13053.

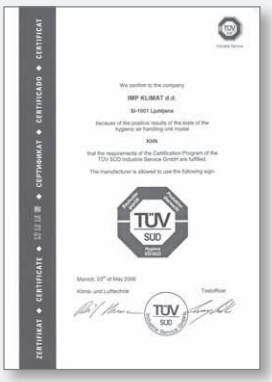
TÜV certified to ISO 9001:2008

Eurovent certificate

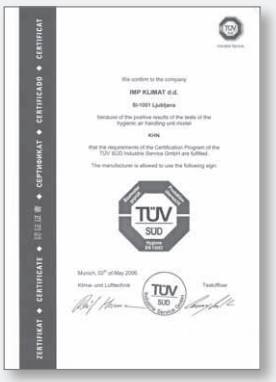
GOST certificate



TÜV certified to DIN 1946-4



TÜV certified to VDI 6022



TÜV certified to EN 13053

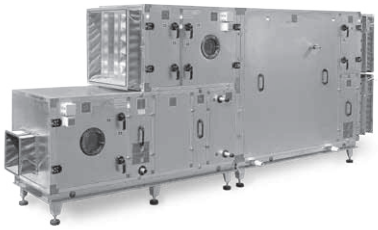
Types of air handling units

We have developed different families of air handling units for our clients to select an optimal unit concerning purpose, place of installation, assembly of functional units and building characteristics.

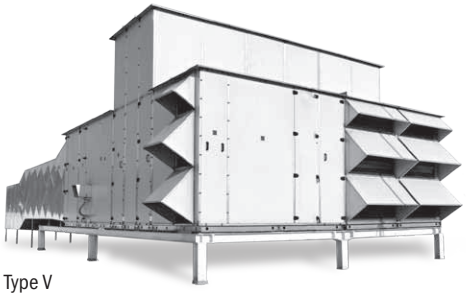
Concerning assembly of functional units and characteristics of a building, there are available:

- horizontal air handling units [L],
- two-stage air handling units [D],
- parallel air handling units [V],
- vertical air handling units [S],
- combined air handling units upon agreement.

Customized solutions also available.



Type D



Type V

Panels and doors

Klimair2, TopAir, TopAir Plus
Top, bottom and side cover panels as well as doors are made of 50 mm double-wall construction, with inner and outer walls of steel sheet and mineral wool thermal insulation filler with density of 100 kg/m³.

Glued to a wall with special procedure, the wool also assumes a supporting function, which ensures outstanding quality in terms of not only thermal and sound insulation, but also solidity. Thermal break aluminium profiles effectively prevent unfavourable thermal bridging on the housing. They are used also for CompAir serie.

Flammability class
Side, bottom and top wall as well as door is class A1 according to DIN 4102, which stands for non-combustible materials.

Filter leakage
Filter leakage complies with class F9 according to EN 1886

Thermal stability
The air handling unit thermal stabillity range is up to +80 °C – on account of the components sensitive to high temperatures, such as fan bearings, drive belts, filter medium, gaskets, etc. For the temperatures exceeding 40 °C, enhanced insulation electric motors shall be installed.

Technical data of air handling units

Casing	50 mm	50 mm
	Klimair2/ TopAir	TopAir Plus
KNN – indoor version	■	■
KZN – outdoor version	■	■
KHN – hygienic version	■	■
KBN – swimmingpool version	■	■
EN 1886		
Casing strength	D1	D1
Casing air leakage	L2	L2
Thermal transmittance	T3	T2
Thermal bridging	TB3	TB2

Sound insulation

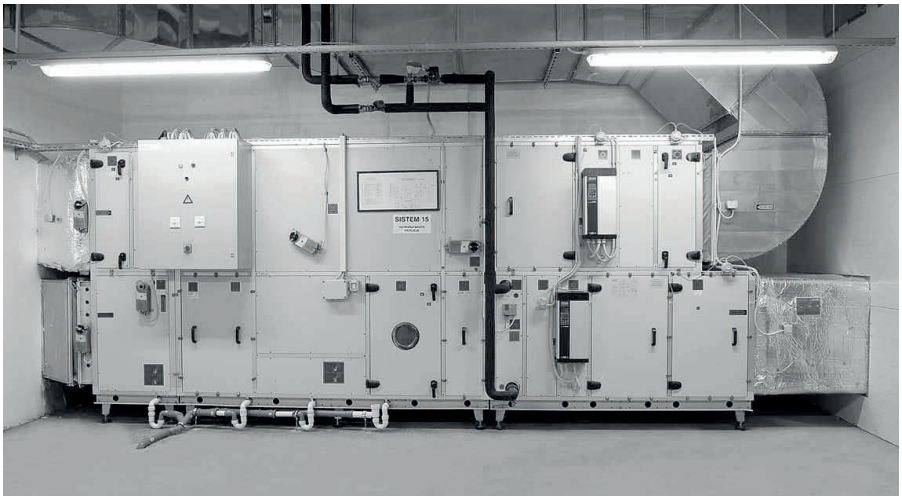
	Band 125 [dB]	Band 250 [dB]	Band 500 [dB]	Band 1000 [dB]	Band 2000 [dB]	Band 4000 [dB]	Band 8000 [dB]
Klimair2	9	10	12	17	21	24	34
TopAir / Plus	12	10	10	16	25	33	43

Custom made, modular AHU

Klimair2, TopAir, TopAir Plus

Indoor version – KNN

The indoor KNN unit air handling unit is the basic version, with galvanized steel sheet exterior and interior. Pipe and other connections are situated on the outer side.



Outdoor type – KZN

The outside KZN air handling unit is made of powder-coated steel sheet; it has a protective roof and special protection hoods and grids at supply air inlet and exhaust air outlet. The connections and control elements are situated in the interior.

Swimming pool version – KBN

An appropriate air handling system as well as suitable temperature and humidity control regimes according to water attraction operation, visitors' activity, outside air conditions, and optimal energy consumption; these are the basic functional requirements for indoor swimming pool air handling considered when designing the pool Klimair2 / TopAir / TopAir Plus air handling unit.

The characteristics of these units are:

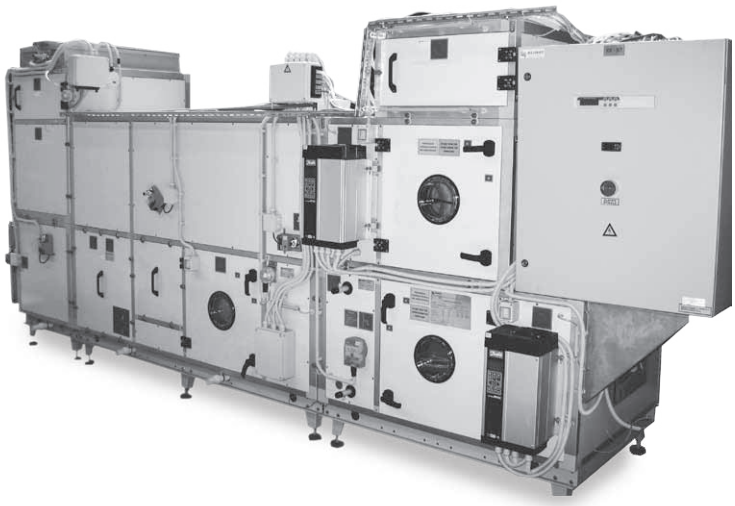
- anti-corrosion materials,
- adjustable microprocessor controllers,
- high efficiency heat recovery,
- energy efficient heat pumps,
- dehumidification capacity up to 185 kg/h,
- quality manufacturing,
- adaptability to room requirements.

KBN housing and equipment:

- housing: panels of 50 mm thickness, with non-flammable insulation, protected with epoxy coating,
- plate recuperator: high efficient, epoxy coating protection,
- heat exchanger coil: Cu/Al, epoxy coating;
- water cooled condenser: pool water resistant, not included in standard equipment;
- integrated cooling circuit: with hermetic compressor, all necessary control and safety equipment included,
- supply and exaust fans: with variable frequency electric motor drive,
- control system: temperature and humidity regulation with DDC control system.

Standard systems – operation regimes of swimming pool air handling units:

a) operation without dehumidification when the swimming pool is out of use,
b) operation with dehumidification when the pool is out of use,
c) operation with or without dehumidification when the pool is in use,
d) operation during transitional and summer seasons with or without dehumidification,
e) operation in summer with high outside temperatures.



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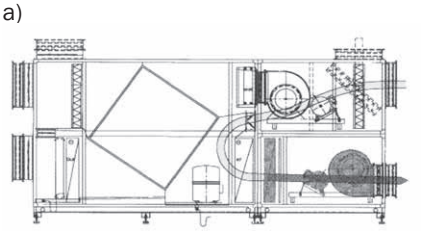
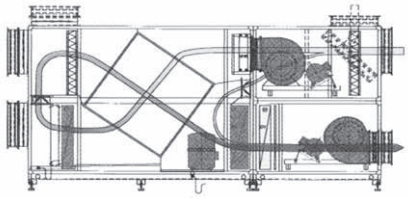


b)



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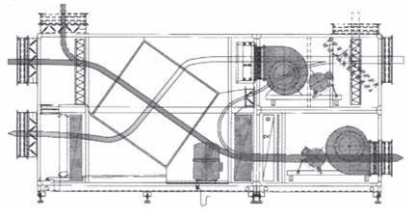

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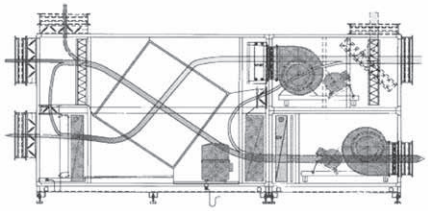

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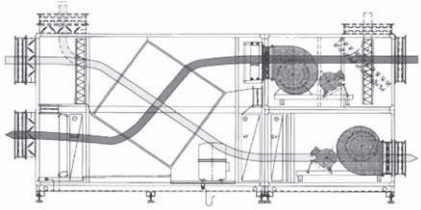


Hygienic type – KHN

A new family of our hygienic air handling units comply with the requirements of the standards DIN 1946– 4, EN 13053 and VDI 6022 and applies to the hygienic requirements for air handling units. As proved by the aquired certificates, these unit are designed for air handling in the most demanding conditions such as hospitals, pharmaceutical and food industries.

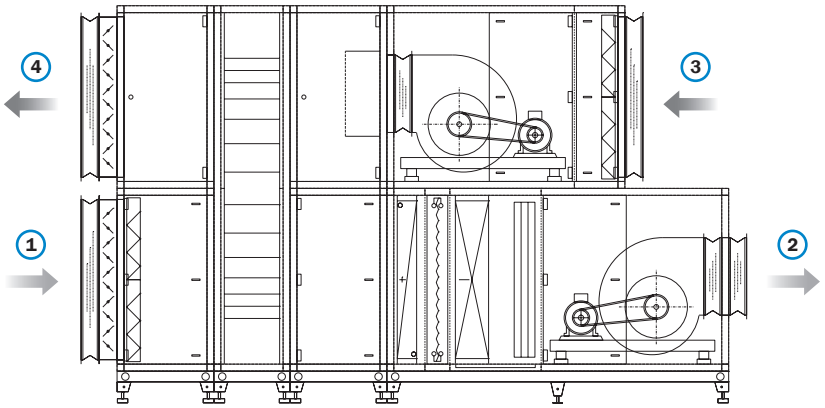
In this application is considered:

- special materials for housing, airtightness,
- no sharp edges, smoothness,
- accesibility to reach and clean each segment of AHU,
- special control system wiring,
- special filtration levels,
- special components: lamps, switches, inspection, dampers, flexible connections, fans, coils, humidifiers...

Standard air handling unit systems in indoor, outdoor and hygienic version

Standard system S 23, “regenair”
Air handling unit for heating, cooling and heat recovery (rotary heat exchanger)

- Heating medium: hot water.
- Cooling medium: cold water.
- Continuous (heating and cooling) control of outlet/room air temperature.
- Limitation of minimal inlet temperature and energy effiecient operation of a rotary heat exchanger.

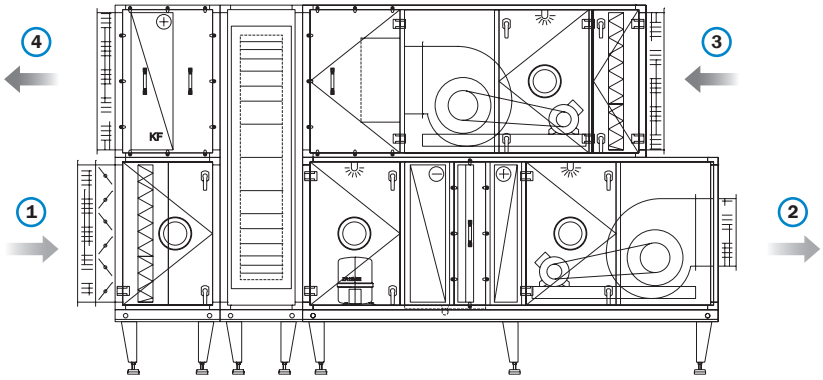


1 Supply (fresh) air 2 Intake air 3 Outlet air 4 Exhaust air

Standard system S 24, "regenair"
Air handling unit for heating, cooling and heat recovery – rotary heat exchanger

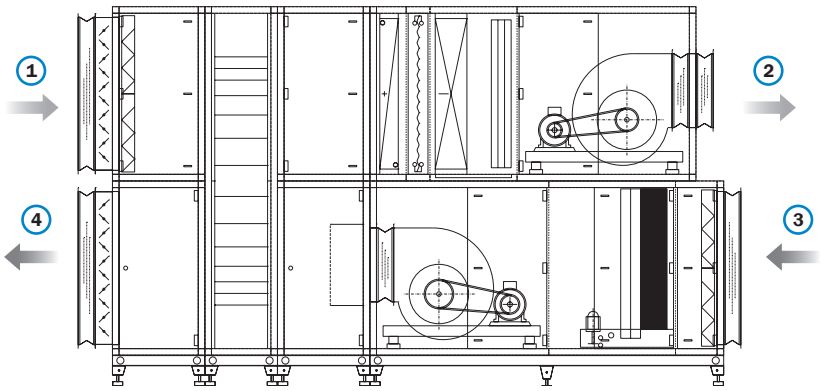
- Heating medium: hot water
- Cooling medium: refrigerant (direct evaporation).
- Continuous (heating) and step control (cooling) of exhaust/room air temperature.
- Limitation of minimal inlet temperature – optimal energy efficient operation of a rotary heat exchanger.

Note: Compressor and air cooled condenser are installed into air handling unit!



Standard system S 41, "adicool" (adiabatic cooling)
Air handling unit for heating, cooling, adiabatic cooling, heat recovery and mixing

- Heating medium: hot water.
- Cooling medium: cold water (water cooler) and circulating water (contact humidifier).
- Continuous control (heating and cooling) of exhaust/room air temperature.
- Limitation of minimal inlet temperature – by optimal energy efficient operation of mixing louvre dampers and rotary heat exchanger.

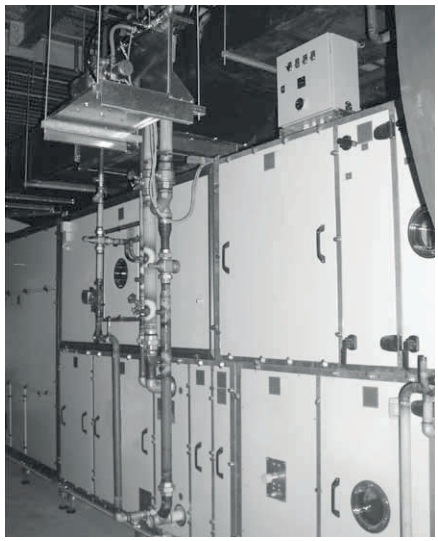


1 Supply (fresh) air 2 Intake air 3 Outlet air 4 Exhaust air

Standard System S 43, Adiabatic or Evaporative Cooling
Adiabatic or evaporative cooling enables air cooling solely by means of pressurized water. If introduced air with temperature of no less than 24 °C, the use of classic cooling sets is not necessary. At lower inlet temperature additional classic cooling agregat is still required however its capacity can be decreased at least by half compared to the classic solution.

This solution with pressurized water converted into so called "cold vapour/steam", is hygienic and it aquired a demanding Hygiene certificate according to the norm VDI 6022 from a competent German institute.

Since the summers of Northern and Central Europe are characterized by rather humid outside air, relative air humidity

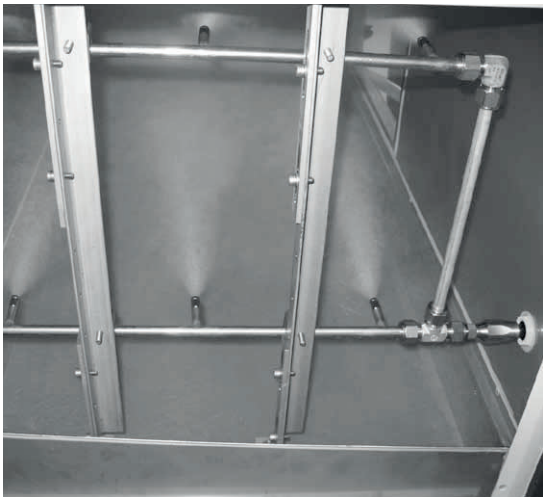


High pressure pump system

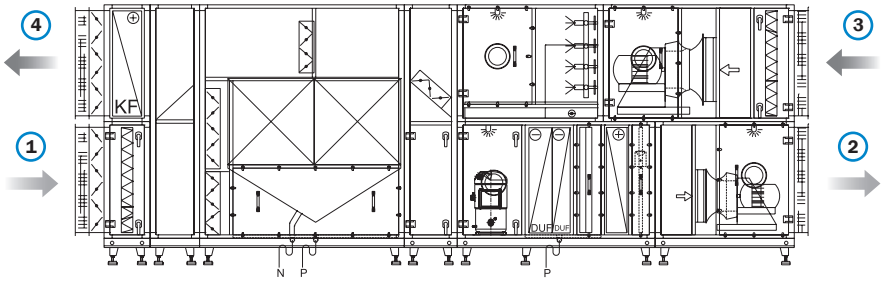
reaching between 40 and 50 %, the procedure of spraying water directly into the incoming fresh air flow is not suitable for these environments. This can be executed only by adiabatic cooling, i.e. water is sprayed into the ambient outlet air, which, thus cooled, passes through a plate or rotary heat exchanger transferring its “coolness” indirectly to the fresh air flow. It is necessary, however, that the recuperator has a sensible heat recovery efficiency of 80 % at least.

An example of operation: the outlet air with a temperature of e.g. 26 °C and e.g. 50 % relative humidity is humidified to approximately 95 % relative humidity, which decreases its temperature to about 19.5 °C. The cooled air then passes through the recuperator outlet side, transferring the ‘coolness’ to the supply air flow; the temperature of the latter thus drops from 32 °C to approximately 24 °C.

The high-pressure system with water at 70 bar pressure allows considerably more efficient water utilization than the humidification principles known so far; about 80 % of the sprayed water actually evaporates, and thus transfers to air (with classic low-pressure water spray systems, the percentage is much lower, namely 5 %). Evaporative systems can only utilize fresh water, which ensures their hygienic suitability. With evaporative cooling, there is no danger of the Legionella bacteria transferring through the HVAC system, while an additional advantage is water pump power consumption, which amounts to only about 0.55 kW.

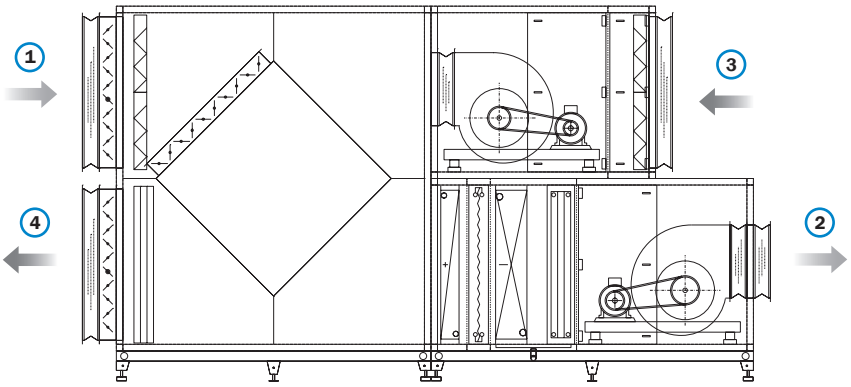


Nozzle system



Standard system S 52, “rekupair – plate”
Air handling unit for heating, cooling and heat recovery – (plate heat exchanger)

- Heating medium: hot water.
- Cooling medium: cold water.
- Continuous control (heating and cooling) of outlet / ambient temperature.
- Limited minimum inlet temperature – with optimal energy efficient operation of a plate heat exchanger.

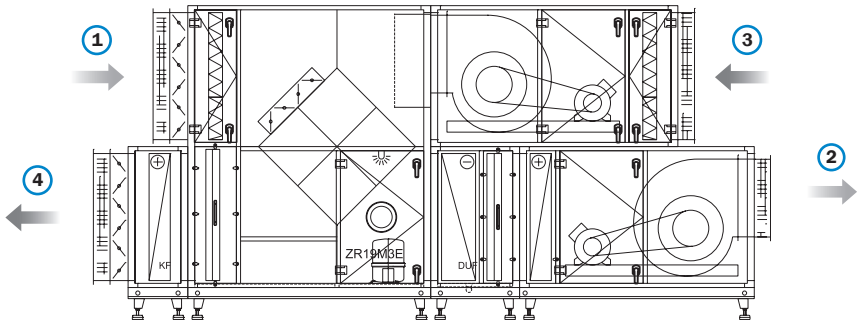


1 Supply (fresh) air 2 Intake air 3 Outlet air 4 Exhaust air

Standard S 53, "rekupair – plate"
Air handling unit for heating, cooling and heat recovery (plate heat exchanger)

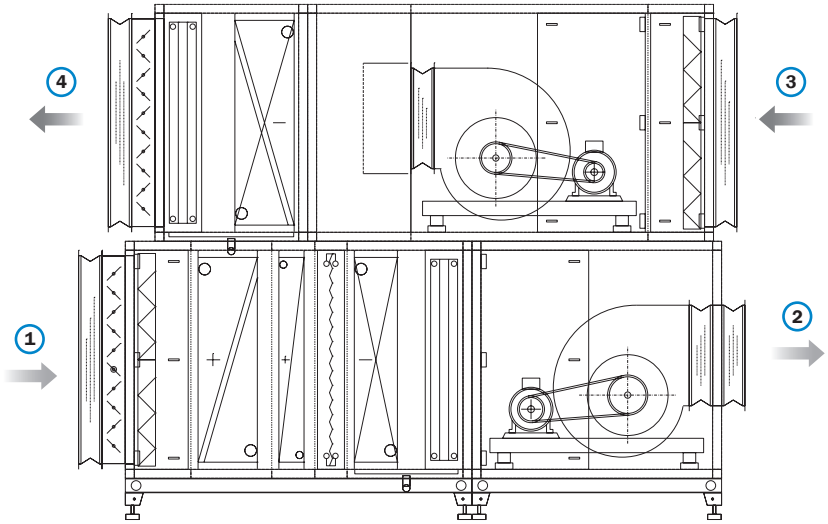
- Heating medium: hot water.
- Cooling medium: halogen refrigerant (direct evaporation).
- Continuous (heating) and step control (cooling) of outlet / ambient temperature.
- Limited minimal inlet temperature – with optimal energy efficient operation of a plate heat exchanger.

Note: Compressors and air cooled condenser are installed in air handling unit!



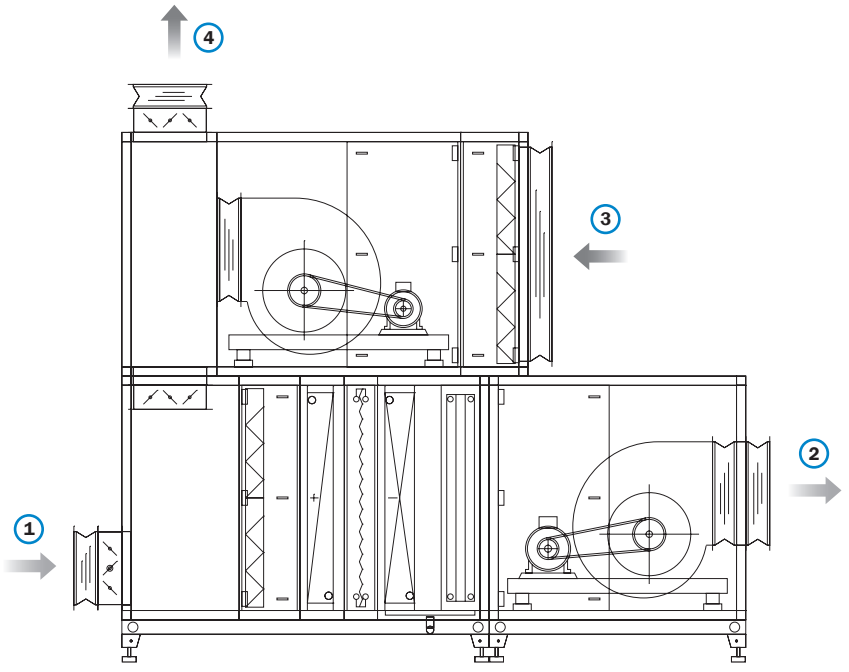
Standard system S 62, "rekupair – fin (glycol)"
Air handling unit for heating, cooling and heat recovery – (fin-glycol heat exchanger)

- Heating medium: hot water.
- Cooling medium: cold water.
- continuous control (heating and cooling) of outlet/ambient air temperature
- Limited minimal inlet temperature – with optimal energy efficient operation of a fin (glycol) heat exchanger.



Standard system S 89
Air handling unit for heating, cooling and mixing

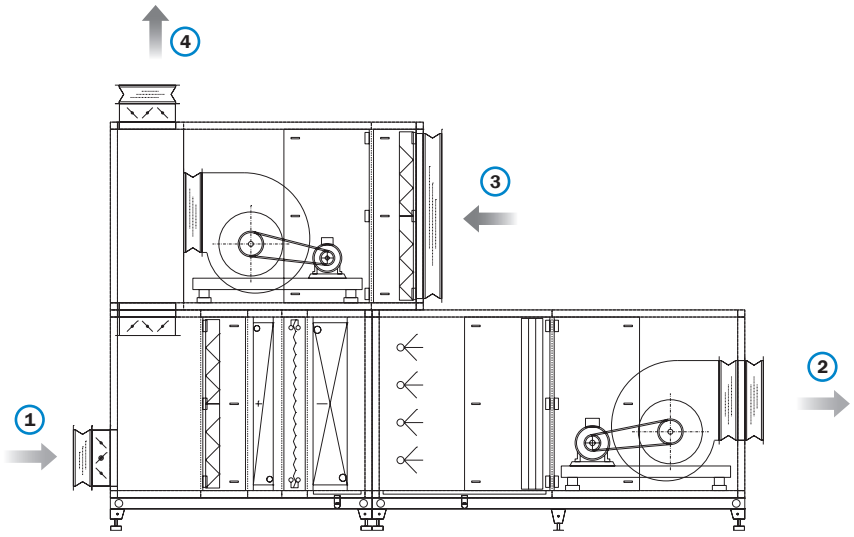
- Heating medium: hot water.
- Cooling medium: cold water.
- Continuous (heating and cooling) control of outlet / ambient temperature.
- Limited minimal inlet temperature – with optimal energy efficient operation of mixing louvre dampers.



1 Supply (fresh) air 2 Intake air 3 Outlet air 4 Exhaust air

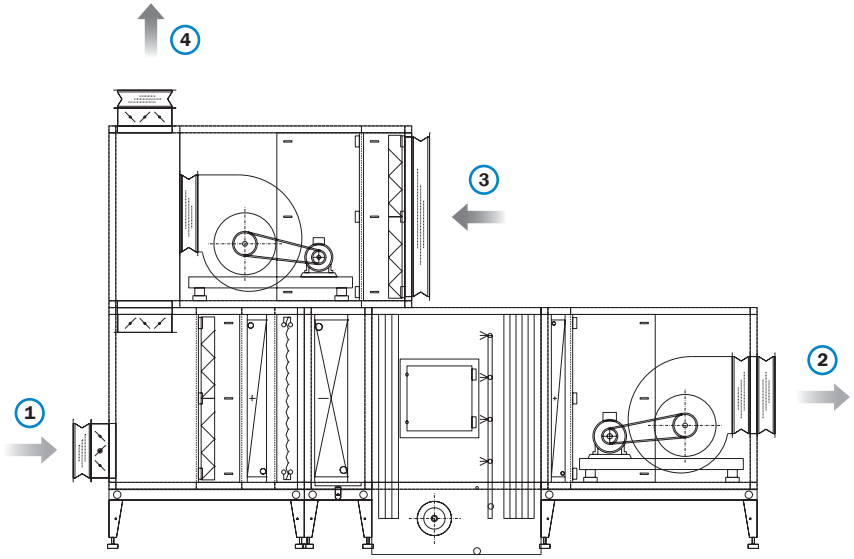
Standard system S 97
Air handling unit for heating, cooling, humidification and mixing.

- Heating medium: hot water.
- Cooling medium: cold water.
- Humidifying medium: steam (independent steam generator).
- Continuous (heating and cooling) control of outlet / ambient temperature and relative humidity.
- Limited minimal temperature and maximal relative humidity of inlet (blow-in) air – with optimal energy efficient operation of mixing louvre dampers.



Standard system S 100
Air handling unit for pre-heating, cooling, humidification, auxiliary heating and mixing – with continuous (stepless) or step control of relative humidity.

- Heating medium (for pre-heater and auxiliary heater): hot water.
- Cooling medium: cold water.
- Humidifying medium: water (spray humidification).
- Continuous (pre-heating and auxiliary heating) control of temperature.
- Continuous or step control of relative humidity of outlet / ambient air.
- Limited minimal temperature and maximal relative humidity of inlet (blown-in) air – with optimal energy efficient operation of mixing louvre dampers.



1 Supply (fresh) air 2 Intake air 3 Outlet air 4 Exhaust air

Designation and ordering key

Ordering key for custom made air handling units

K X N X d50 ØØ/ØØ - XØX, ØX,.. ØX - X * ØØ/ØØ -XØX, ØX,.. ØX - X**

Access side (From the point of air flow direction*)
- **L** left
- **R** right

functional sections in sequence reverse to the flow of air

unit dimensions width/height

d wall-thickness 50 mm

- **L** horizontal
- **D** two-stage
- **V** parallel
- **S** vertical
- **K** combined

N unit design

- **N** indoor install. type
- **Z** outdoor install. type
- **H** hygienic grade type
- **B** pool type

K air handling unit

accessories – specified descriptively

* With two stage design, the access side specification applies to the intake unit part.

Designation example:

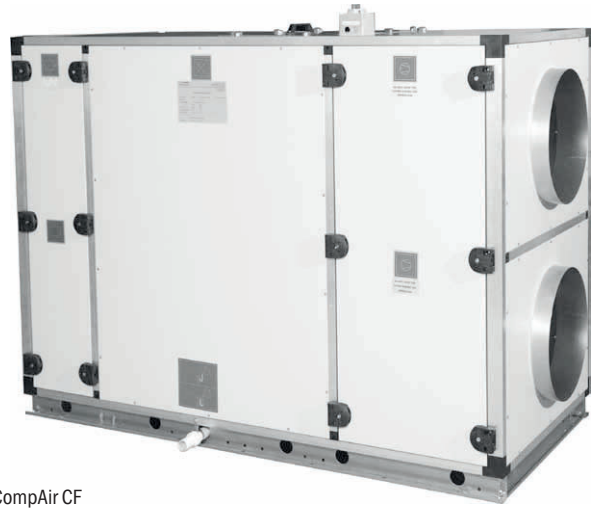
KNND 9/9 d50-ST, VR, KW-TA, FR, EW, RPDM-TA-FK, M-6-2, J, ST, ST, VR, FK-3, J, ST-R

Compact units plug&play

CompAir CF, CompAir RW

CompAir

CompAir is a family of air handling units in seven sizes, designed for volume air flow from 500 up to 11.000 m³/h. The basic characteristics of the unit is high efficient heat recovery of the exhaust air. As an additional option heating and/or cooling can be included. The basic model consists of a high efficient counterflow heat exchanger, an inlet and outlet fans, F7 filters on the inlet side and G4 filter on the outlet side. The basic model is built in one section, so called monoblock. Concerning the customer's requirements the units can be separated in more sections. These units are designed for outdoor and indoor installation.



CompAir CF

Basic version:

- CF: highly efficient counterfow heat exchanger with by-pass function,
- RW: highly efficient rotary wheel,
- Inlet and outlet fans with electronically commutated motors and required electronics,
- filter on inlet and outlet side,
- upon customer’s request: accessories and functions.

CompAir RW

Housing structure:

- sound and heat insulated aluminium profiiles and polyamid corner profiles,
- basic option see panels TopAir/Klimair2: T3, TB3 class.
- “Plus” option: panels TopAir Plus; T2, TB2 class.
- exterior of the panels coated by the RAL 7035.

Configurations:

- compact – “monoblock” [M],
- splitted [S],
- inside version [I],
- outside version [O].

Functions:

- water heater,
- water cooler,
- DX cooler,
- electrical heater,
- preheater,
- heater and cooler.

Accessories:
- PGD display and remote control,
- larger controllers,
- different PCO cards,
- different sensors,
- roof for outdoor version,
- an inlet and outlet hood for outdoor version,
- dampers with actuators,
- round duct connections,
- flexible connections,
- support feet,
- syphon.

Control system, possibilities:
- continous or step-wise control of heating and cooling,
- continous control of heat recovery,
- free cooling function,
- de-icing protection,
- setting different air flows,
- clock card for time schedule,
- remote control by LCD display,
- fire sequence, free programming or override,
- constant pressure control,
- air flow rate control.

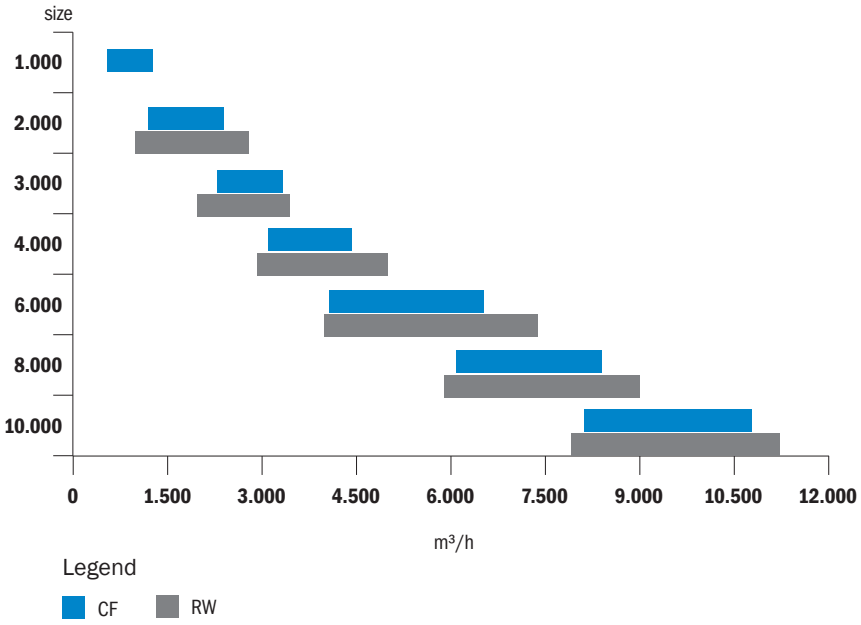
Advantages:
- seven standard sizes cover all the requirements for residential, small and medium size business buildings,
- high efficiency up to 90 %,
- the units are distinguished by the high quality components,
- the units can be connected to any central control systems with different protocols.

Further technical characteristics are available in Technical brochure CompAir on http://www.hidria.com/en/climate/programs/ahu/.

Overview of compact air handling units

	Housing		Airflow	Heat recovery	
	Type	mm	m³/h	Type	Up to %
CompAir CF	Klimair2/ TopAir/ TopAir Plus	50	500÷10.700	◆	93
CompAir RW	Klimair2/ TopAir/ TopAir Plus	50	1.100÷11.500	●	85

Air flow rate

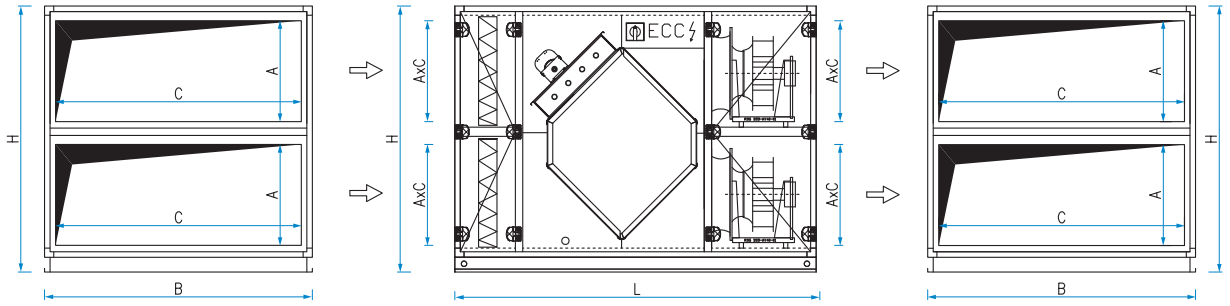


CompAir CF technical data

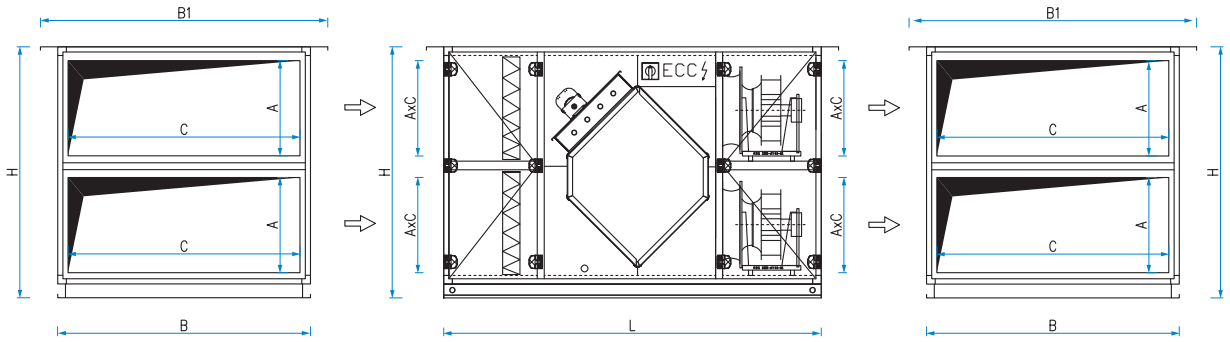
Size	1000	2000	3000	4000	6000	8000	10000
Airflow range: (m³/h)	500-1150	1100-2300	2200-3400	3100-4500	4000-6400	6000-8300	8000-10700
Electrical supply: (V)	1 x 230	3 x 380	3 x 380	3 x 380	3 x 380	3 x 380	3 x 380
Motor and fan type:	EC Radial fan backwards curved without housing						
Frequency:	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
Input power (pre fan):	448 W	1000 W	1000 W	1700 W	3000 W	2825 W	5500 W
Current draw (per fan):	2,8 A	1,63 A	1,7 A	2,6 A	4,6 A	4,3 A	8,4 A
Insulation:	50 mm mineral wool						
Color:	RAL 7035						
Filter type:	Panel filter						
Filter class:	G4/F7						
Damper exaust:	Outlet air damper 24 V actuator						
Damper supply:	Supply (fresh air) damper 24 V actuator						
Condense connection:	DN40						
Duct dimension AxC (mm):	630 x 450	935 x 550	1035 x 550	1340 x 550	1660 x 690	1800 x 855	2155 x 855
Heater connections:	3/4˝	3/4˝	3/4˝	3/4˝	3/4˝	3/4˝	1˝
Cooler connections:	3/4˝	1˝	1˝	1˝	1 1/2˝	1 1/2˝	2˝
Dimension inside (mm):	Monoblock / Splitted (L1+L2+L3)				Splitted (L1+L2+L3)		
Length L (mm):	1670	1850	1970	1970	2360	2690	2690
Length with preheater or heater or cooler (mm):	1980	2160	2280	2280	2670	3000	3000
Length with heater and cooler (mm):	2100	2280	2400	2400	2790	3120	3120
Height H (mm):	1250	1450	1450	1450	1730	2060	2060
Width B (mm):	750	1055	1155	1460	1780	1920	2275
Dimension outside (mm):	Monoblock / Splitted (L1+L2+L3)				Splitted (L1+L2+L3)		
Length L (mm):	1880	2060	2180	2180	2690	3020	3020
Length with preheater or heater or cooler (mm):	2190	2370	2490	2490	3000	3330	3330
Length with heater and cooler (mm):	2310	2490	2610	2620	3120	3450	3450
Height H (mm):	1250	1450	1450	1450	1730	2060	2060
Width B/B1 (mm):	750/950	1055/1255	1155/1350	1460/1660	1780/1980	1920/2120	2275/2475
Length with preheater and heater or cooler (mm): inside	2290	2470	2590	2590	2980	3310	3310
Length with preheater and heater and cooler (mm): inside	2410	2590	2710	2710	3100	3430	3430
Length with preheater and heater or cooler (mm): outside	2500	2680	2800	2800	3310	3640	3640
Length with preheater and heater and cooler (mm): outside	2620	2800	2920	2920	3430	3760	3760
Efficiency:		up to 90 %					
Heat recovery:		High efficiency counter flow plate heat exchanger					
Operating temperature:		-20 °C to 40 °C					

CompAir CF unit dimensions

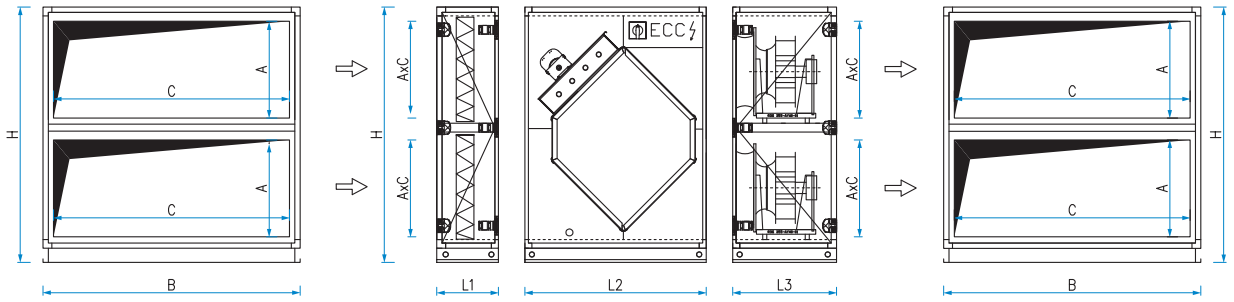
Monoblock inside version



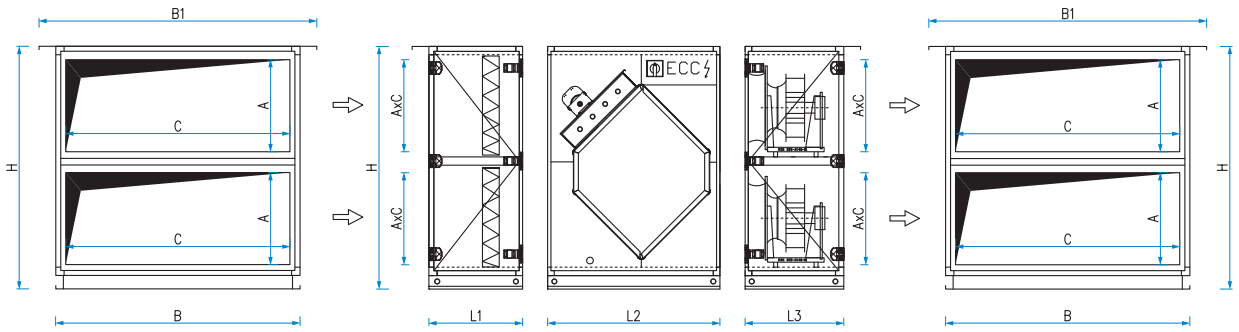
Monoblock outside version



Splitted inside version



Splitted outside version

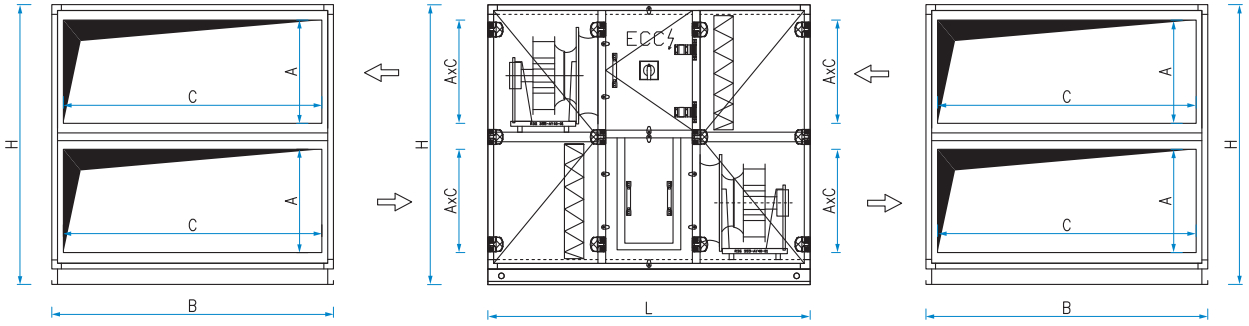


CompAir RW technical data

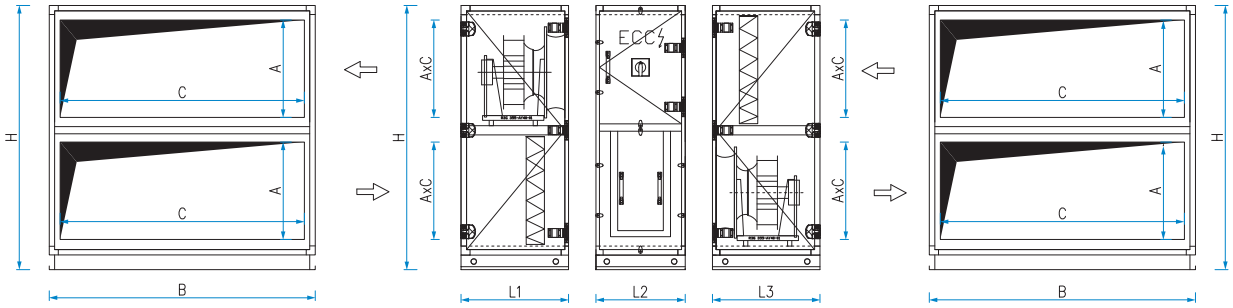
Size	2000	3000	4000	6000	8000	10000
Airflow range: (m³/h)	1100-2700	2100-3500	3100-5100	4500-7500	6500-9100	8000-11500
Electrical supply: (V)	3 x 380	3 x 380	3 x 380	3 x 380	3 x 380	3 x 380
Motor and fan type:	EC Radial fan backwards curved without housing					
Frequency:	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
Input power:	1000 W	1000 W	1700 W	3000 W	2850 W	5500 W
Imax:	1,63 A	1,7 A	2,6 A	4,6 A	4,3 A	8,4 A
Insulation:	50 mm mineral wool					
Color:	RAL 7035					
Filter type:	Panel filter					
Filter class:	G4/F7					
Damper exaust:	Outlet air damper 24 V actuator					
Damper supply:	Supply (fresh air) damper 24 V actuator					
Condense connection:	DN40					
Duct dimension AxC (mm):	935 x 550	1035 x 550	1340 x 550	1660 x 690	1800 x 855	2155 x 855
Heater connections:	3/4˝	3/4˝	3/4˝	3/4˝	3/4˝	1˝
Cooler connections:	1˝	1˝	1˝	1 1/2˝	1 1/2˝	2˝
Dimension inside/outside (mm):	Monoblock / Splitted (L1+L2+L3)			Splitted (L1+L2+L3)		
Length L (mm):	1670	1670	1670	1850	1970	1970
Length with preheater or heater or cooler (mm):	1980	1980	1980	2160	2280	2280
Length with heater and cooler (mm):	2100	2100	2100	2280	2400	2400
Length with preheater and heater or cooler (mm):	2290	2290	2290	2470	2590	2590
Length with preheater and heater and cooler (mm): inside	2410	2410	2410	2590	2710	2710
Height H (mm):	1450	1450	1450	1730	2060	2060
Width B/B1 (mm):	1055/1255	1155/1355	1460/1660	1780/1980	1920/2120	2275/2475
Efficiency:	up to 85 %					
Heat recovery:	Rotary wheel 250 mm					
Operating temperature:	-20 °C to 40 °C					

CompAir RW unit dimensions

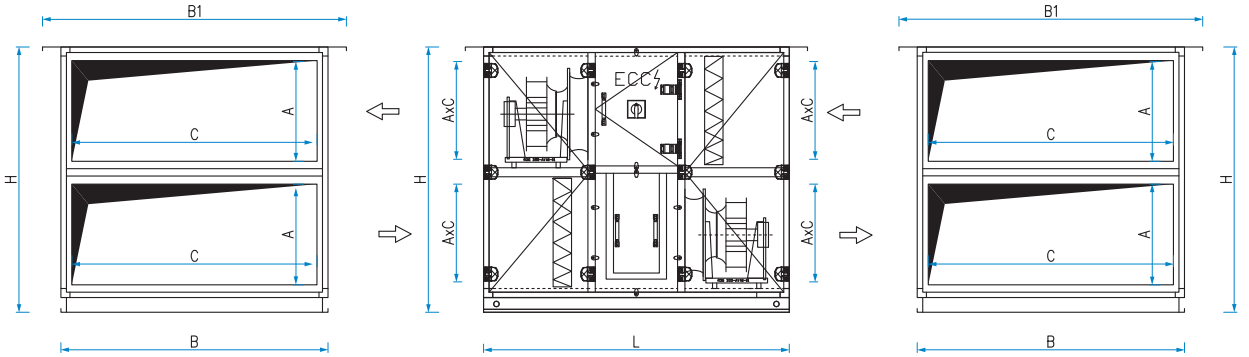
Monoblock inside version



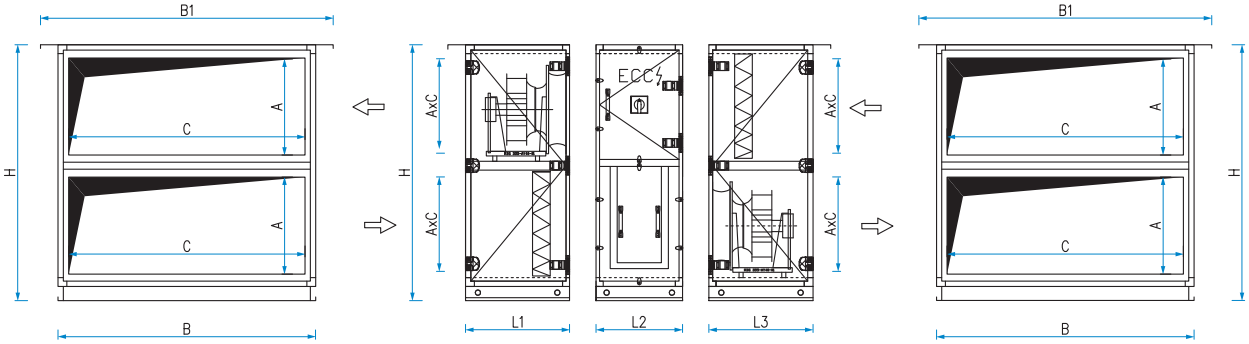
Monoblock outside version



Splitted inside version



Splitted outside version

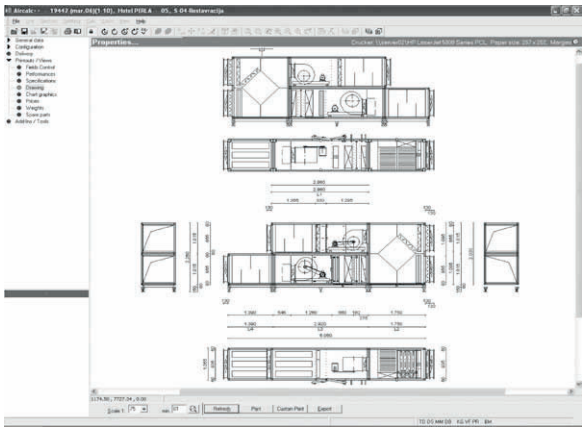


Selection programme Aircalc++

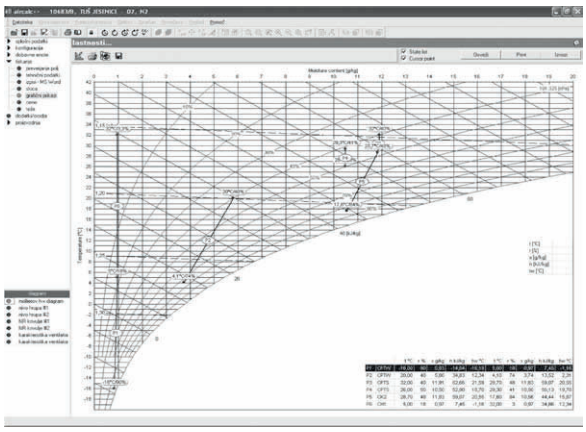
Selection programme Aircalc++ is an efficient tool for project engineers.

Software

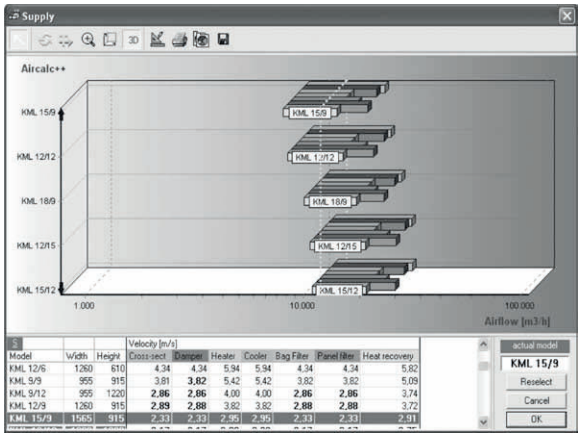
- A precise definition of an air handling unit.
- Wide range of records and drawings.
- Archiving of the calculations and projects.
- Excellent internet transmission of calculations and plans.
- Direct transmission of calculations into the production.
- Process outline in h-x diagram.
- Fan noise curve plotting.
- Export of drawings to dwg format.
- Eurovent certified!



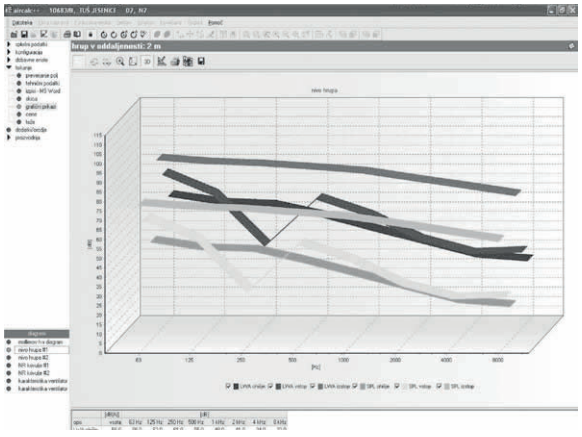
Drawings – different views



H-x diagram



Size selection



Fan noise curve

Ordering key

CompAir CF (Plus) 1000-R-I(1)-M-EW-DA1(1)3(1)-FC1234-RC1234-PH1(1)4(1)-FT-RF-SY-ECC1-PGD-PC1-QS1-PS1

Accessories – see connections:
1) supply intake **2)** supply outlet **3)** exhaust intake **4)** exhaust outlet

Heat recovery:
- **CF** counter flow heat exchanger
- **RW** rotary wheel exchanger

Housing type:
- **Plus** plus housing
- **(empty)** basic housing

Unit size:
1000
2000
3000
4000
6000
8000
10000

- **R** right
- **L** left

Unit type:
- **M** monoblock
- **S** splitted

- **I(1)** inside unit with supply on under side
- **I(2)** inside unit with supply on upper side
- **O(1)** outside unit with supply on under side
- **O(2)** outside unit with supply on upper side
- **O(3)** outside unit with bottom connection
- **O(4)** outside unit with bottom connection and frame

Accessories 1 (function):
- **E** empty section
- **EW** water heater
- **KW** water cooler
- **EW+KW** water heater + water cooler
- **EW+KD** water heater + dx cooler
- **KD** dx cooler
- **EWV** water pre-heater
- **EE(6)** electrical heater (electrical heater power kW)
- **EWV,EW** water pre-heater, water heater
- **EWV,EW+KW** water pre-heater, water heater + cooler
- **EE,EW** electrical pre-heater, water heater
- **EE,EW+KW** electrical pre-heater, water heater + cooler
- **KW(EW)** Water reversible coil
- **D/K** Dx reversible coil
- **x** without function

DA1(1)3(1) dampers on connections 1,3 - actuator on/off
DA1(2)3(2) dampers on connections 1,3 - spring actuator
DA1(x)3(x) without actuator on both dampers
DA1(1) damper on connection 1 - actuator on/off
DA1(2) damper on connection 1 - spring actuator
DA1(x) without actuator
x without damper and actuator

FC1234 flexible canvas on connections 1,2,3,4
FC24 flexible canvas on connections 2,4
x without flexible canvas

RC1234 round connections on connections 1,2,3,4
RC24 round connections on connections 2,4
x without round connections

PH1(1)4(1) protection hood on standard connections 1,4
PH1(2)4(2) protection hood on back side of unit
x without protection hood

FT feet
x without feet

RF roof walley
x without roof walley

SY Syphon
SYH Heating syphon
x Without syphon

Accessories 3 (additional equipment):

ECC1 (controller PCO3 S, by-pass damper actuator (only CF), 4 temperature sensors)
ECC2 (controller PCO3 L, by-pass damper actuator (only CF), 4 temperature sensors)
ECC3 (controller PCO3 S, by-pass damper actuator (only CF), 4 temperature sensors, 2 differential pressure switches)
ECC4 (controller PCO3 L, by-pass damper actuator (only CF), 4 temperature sensors, 2 differential pressure switches)
ECC5 – KW(EW) (controller PCO3 L, by-pass damper actuator (only CF), 4 temperature sensors, 2 differential pressure switches, additional module for reversible coils)
ECC6 – D/K (controller PCO3 L, by-pass damper actuator (only CF), 4 temperature sensors, 2 differential pressure switches, additional module for reversible coils)
x without ECC

PGD remote controller
x without remote controll

PC1 PCO Web Card pCOWEB
PC2 PCO Web Card pCOWEB with interface
PC3 PCO Card LONFTT3
PC4 PCO Card MODBUS 3
x without card

QS1 Sensor CO_2 - duct
QS2 Sensor CO_2 - room
x without CO_2 sensor

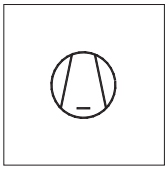
PS1 2x Pressure sensor (room QBM66.201)
PS2 2x Pressure sensor (duct QBM66.202)
PS3 2x Pressure sensor (airflow QBM66.203)
x without pressure sensor

Functional units and designations

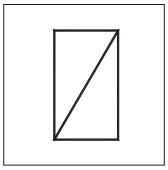
New designation	Description
VR	Fan section – belt driven fan
VD	Fan section – direct driven fan
VF	Fan section – freewheeling fan
EW	Heating section with water heater
ED	Heating section with steam heater
EK	Heating section with condenser
EE	Heating section with electric heater
EGI	Heating section with indirect gas heater
FR	Anti-freezing protection section
BLW	Humidification section with spray humidifier
BD	Humidification section with steam humidifier
BWA	Humidification section with contact humidifier
BWH	Humidification section with high pressure humidifier
KW	Cooling section with water cooler
KD	Cooling section with direct evaporator
KW-TA	Cooling section with water cooler – with droplet eliminator
KD-TA	Cooling section with direct evaporator – with droplet eliminator
TA	Droplet eliminator
KO	Compressor section
A	Intake (pressure) section – with single control damper, with flexible duct connection
M	Mixing section – with two control dampers, with flexible duct connection
MD	Dual mixing section – with three control dampers, with flexible duct connection
U	Circulation section
FK	Cartridge filter section
FZ	ZIGZAG filter section
FT	Bag filter section
FTT	Bag filter section – model with door
FM	Metal filter section
FAK	Activated carbon filter section
FA	Absolute filter section
S	Sound attenuation section

New designation	Description
LU	Empty angle section
RKE	Recuperation section with fin recuperator (heating part)
RKK	Recuperation section with fin recuperator (cooling part)
RKK-TA	Recuperation section with fin recuperator (cooling part) and droplet eliminator
RPD	Recuperation section with plate recuperator (diagonal design)
RPDC	Recuperation section with counter flow heat exchanger
RPDB	Recuperation section with double plate heat exchanger
RRG	Recuperation section with rotary recuperator – encased design
RRF	Recuperation section with rotary recuperator – flanged design
RWR	Recuperation section with heat pipe
D	Diffuser section
J	Control damper
ST	Flexible connection
H	Protection hood
WSG	Protection grille
EEJ	Control damper electric heater

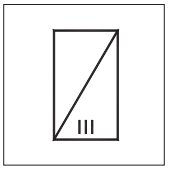
RADIAL FAN SECTION



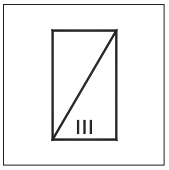
WATER HEATER SECTION



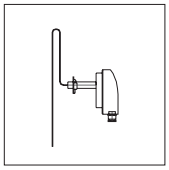
STEAM HEATER SECTION



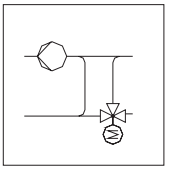
CONDENSER SECTION



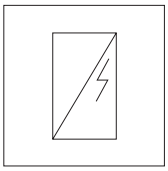
ANTI-FREEZING PROTECTION SECTION



CIRCUIT SECTION: HEATING, COOLING, FIN RECUPERATION

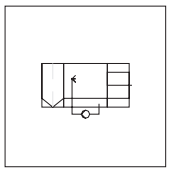


ELECTRIC HEATER SECTION

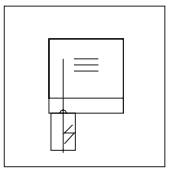


GAS HEATER SECTION

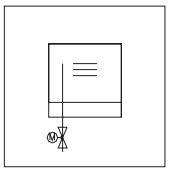
SPRAY HUMIDIFIER SECTION



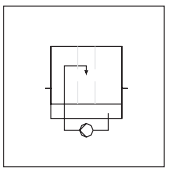
STEAM HUMIDIFIER SECTION WITH ELECTRIC STEAM GENERATOR



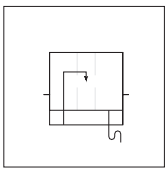
STEAM HUMIDIFIER WITH OUTSIDE STEAM SECTION



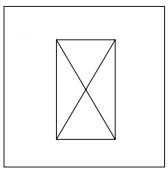
CONTACT HUMIDIFIER WITH CIRCULATING WATER SECTION



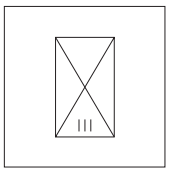
CONTACT HUMIDIFIER WITH DIRECT WATER SECTION



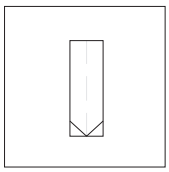
WATER COOLER SECTION



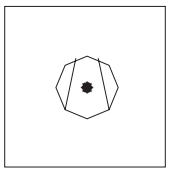
DIRECT EVAPORATOR SECTION



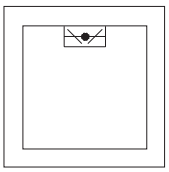
DROPLET ELIMINATOR



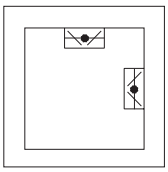
COMPRESSOR SECTION



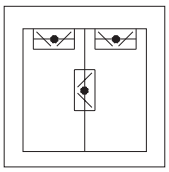
SECTION WITH ONE CONTROL DAMPER



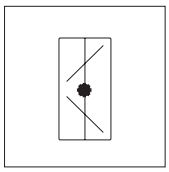
SECTION WITH TWO CONTROL DAMPERS



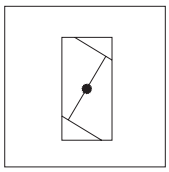
DUAL MIXING SECTION



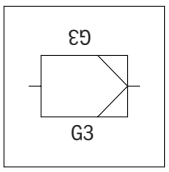
CONTROL DAMPER



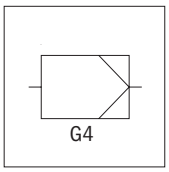
AIR-TIGHT CONTROL DAMPER



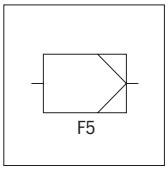
FILTRATION CLASS G3 FILTER SECTION



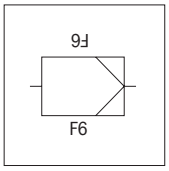
FILTRATION CLASS G4 FILTER SECTION



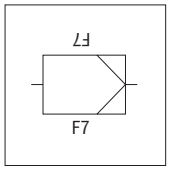
FILTRATION CLASS F5 FILTER SECTION



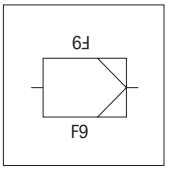
FILTRATION CLASS F6 FILTER SECTION



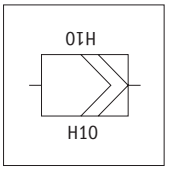
FILTRATION CLASS F7 FILTER SECTION



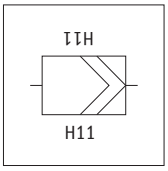
FILTRATION CLASS F9 FILTER SECTION



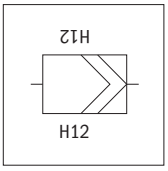
FILTRATION CLASS H10 ABSOLUTE FILTER SECTION



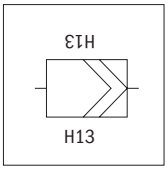
FILTRATION CLASS H11 ABSOLUTE FILTER SECTION



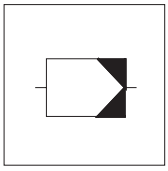
FILTRATION CLASS H12 ABSOLUTE FILTER SECTION



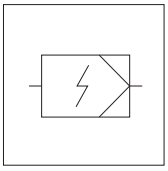
FILTRATION CLASS H13 ABSOLUTE FILTER SECTION



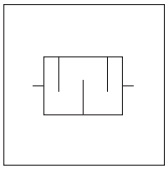
ACTIVATED CHARCOAL FILTER SECTION



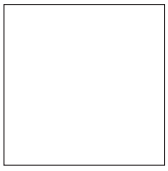
ELECTROSTATIC FILTER SECTION



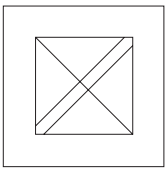
SOUND ATTENUATION SECTION



EMPTY SECTION



FIN RECUPERATOR SECTION – HEATING PART



FIN RECUPERATOR SECTION – COOLING PART

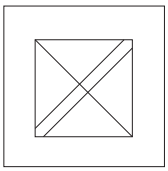
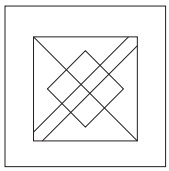
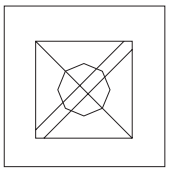


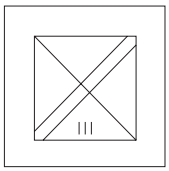
PLATE RECUPERATOR SECTION



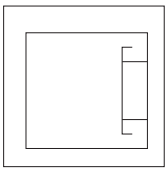
ROTARY REGENERATOR SECTION



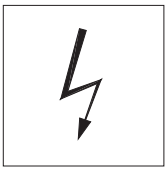
HEAT PIPE SECTION



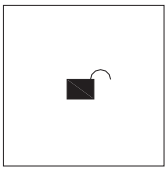
SHORT DIFFUSER SECTION



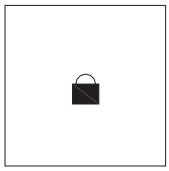
ELECTRIC CONTROL CABINET SECTION



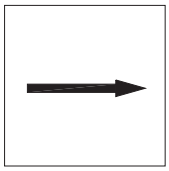
HANDLE POSITION OPEN



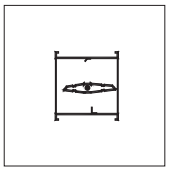
HANDLE POSITION CLOSED



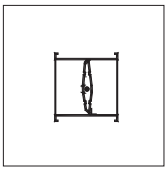
AIR DIRECTION MEDIUM DIRECTION



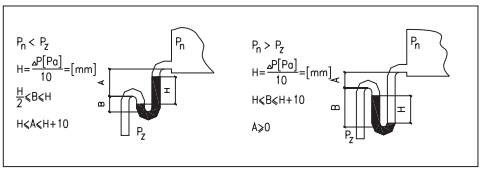
CONTROL DAMPER OPEN



CONTROL DAMPER CLOSED



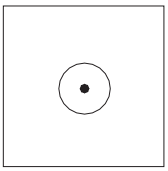
CONDENSATE DRAIN TRAP DIMENSIONING



HEATING FUNCTION

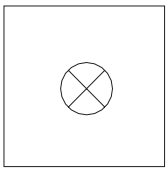
MEDIUM ENTRY RED COLOUR

MEDIUM EXIT BLUE COLOUR

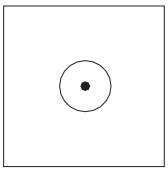


COOLING FUNCTION

MEDIUM ENTRY BLUE COLOUR



MEDIUM EXIT RED COLOUR



02

Fan section

Heating section

Humidification section

Cooling section

Filter section

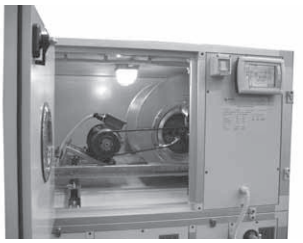
Heat recovery section

Functional sections of air handling units

Fan, heating, humidification, cooling, air regulating, filter, sound attenuation and heat recovery section can be selected for each air handling unit.

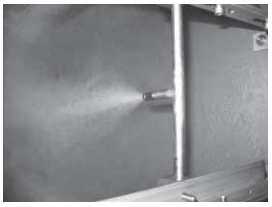
General

Overview



Fan section

Heating section



Humidification section

Cooling section

Filter section

Heat recovery section

Fan section

Fan section is applied in ventilation and air conditioning engineering. They are installed in air handling units, or applied as stand alone elements, built into different distribution ducts to maintain the required or specified flow rate.

We have different variants of fan section:

- belt driven fan,
- direct driven fan – external rotor electric motor,
- direct driven fan – electronically commutated electric motor with external rotor,
- plug fan (without spiral housing).

Heating section

Finned heat exchangers are applied in air heating, cooling and dehumidifying with different media (water, water/antifreeze mixtures, cooling media, oils, steam) in air conditioning and industry. They are designed for installation in A/C units or air ducts.

Heat exchangers are used as:

- water heater (type GV) or water cooler (type HV),
- steam heater (type GP),
- direct evaporator (type KD),
- condenser (type KF, AVK),
- finned heat exchangers.

Humidification section

Humidification section provides for the increasing of the moisture of the inlet air to the suitable temperature which depends of the working environment.

- Types of humidification units:
- humidification section with spray humidifier,
- humidification section with steam humidifier,
- humidification section with contact humidifier,
- high pressure shower humidifier.

Cooling section

Cooling section provides for the cooling of the inlet air in the summer season. It is designed regarding the inlet parameters and flow rate.

We have different types of cooling units:

- cooling section with water cooler,
- cooling section with water cooler with droplet eliminator,
- cooling section with direct evaporator.

Heat recovery section

Recuperation section intends to return back the input energy in the system – heating in the winter season and cooling in the summer season. The efficiency of the system with the recuperation section is from 50 to 90 %. This means a huge savings of energy and money.

Types of recuperation units:

- recuperation section with fin recuperator,
- recuperation section with plate recuperator,
- regeneration section with rotary regenerator.
- recuperation section with double plate recuperator
- recuperation section with counter flow recuperator

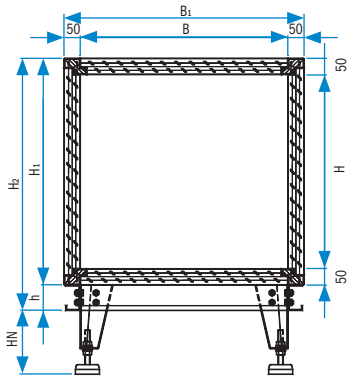
Filter section

Filter section provides for the quality of inlet air. Regarding the quality of the desired air and the level of filtration different filters are installed from the simple ones to the more demanding which are installed in the hospitals and laboratories. Different types of filters: cartridge, zigzag, bag, band, metal, absolute and activated charcoal filter section.

Content

Air handling unit size specifications

Cross section dimensions



h = 80 ⇒ HN = 150 ÷ 210 mm
h = 100 ⇒ HN = 140 ÷ 200 mm

Size	B (mm)	H (mm)	B1 (mm)	H1 (mm)	h (mm)	H2 (mm)	Aef (m^2)
6/3	650	305	750	405	80	485	0,20
9/3	955	305	1055	405	80	485	0,29
6/5	650	510	750	610	80	690	0,33
6/6	650	610	750	710	80	790	0,40
9/6	955	610	1055	710	80	790	0,58
12/6	1260	610	1360	710	80	790	0,77
6/9	650	915	750	1015	80	1095	0,59
9/9	955	915	1055	1015	80	1095	0,87
12/9	1260	915	1360	1015	80	1095	1,15
15/9	1565	915	1665	1015	80	1095	1,43
18/9	1870	915	1970	1015	80	1095	1,71
9/12	955	1220	1055	1320	80	1400	1,17
12/12	1260	1220	1360	1320	80	1400	1,54
15/12	1565	1220	1665	1320	100	1420	1,91
18/12	1870	1220	1970	1320	100	1420	2,28
21/12	2175	1220	2275	1320	100	1420	2,65
12/15	1260	1525	1360	1625	100	1725	1,92
15/15	1565	1525	1665	1625	100	1725	2,39
18/15	1870	1525	1970	1625	100	1725	2,85
21/15	2175	1525	2275	1625	100	1725	3,32
24/15	2480	1525	2580	1625	100	1725	3,78
15/18	1565	1830	1665	1930	100	2030	2,86
18/18	1870	1830	1970	1930	100	2030	3,42
21/18	2175	1830	2275	1930	100	2030	3,98
24/18	2480	1830	2580	1930	100	2030	4,54
27/18	2785	1830	2885	1930	100	2030	5,10
18/21	1870	2135	1970	2235	100	2335	3,99
21/21	2175	2135	2275	2235	100	2335	4,64
24/21	2480	2135	2580	2235	100	2335	5,29
27/21	2785	2135	2885	2235	100	2335	5,95
30/21	3090	2135	3190	2235	100	2335	6,60
21/24	2175	2440	2275	2540	100	2640	5,31
24/24	2480	2440	2580	2540	100	2640	6,05
27/24	2785	2440	2885	2540	100	2640	6,80
30/24	3090	2440	3190	2540	100	2640	7,54
24/27	2480	2745	2580	2845	100	2945	6,81

Bigger units available on customer's request.

Air handling unit size specification guidelines

According to RAL-GZ 652

Control dampers, duct connections and mixing units (not applicable to circulation and bypass dampers)

Intake velocity	vzr ≤ 8 m/s
Intake angle (damper to functional element, e.g. filter)	α ≥ 35°
Outlet angle (functional element, e.g. filter, to damper)	β ≥ 25°

Outdoor air handling units

	Intake velocity v_{zr}	
	Intake side	**Pressure side**
Protection grille	≤ 2,5 m/s	≤ 4,0 m/s
Droplet eliminator	≤ 3,5 m/s	≤ 5,0 m/s
Hoods	≤ 4,5 m/s	≤ 6,0 m/s

Filters

Filter surface	min 10 m² per 1 m² cross section (not applicable to coarse filters)
Intake velocity	v_{zr} ≤ 3,2 m/s (not applicable to activated carbon filters, absolute filters, etc.)
Final pressure drop	F5 – F7 ⇒ Δpk = 200 Pa...
Final pressure drop	F8 – F9 ⇒ Δpk = 300 Pa
Pressure drop for dimensioning purposes	Δp = (Δpz + Δpk)/2

Air heaters and coolers

	Heater	**Cooler**
Intake velocity to finned surface v_{zr}	volume air flow rate ≤ 10000 m³/h ⇒ v_{zr} ≤ 4 m/s	
	volume air flow rate > 10000 m³/h ⇒ v_{zr} ≤ 3,5 m/s	
Water side pressure drop	Δp ≤ 20 kPa	Δp ≤ 50 kPa
Fin pitch	≥ 2,0 mm	≥ 2,4 mm

Waste heat recovery sections

	Minimum heat recovery factor (ø[1]) (-)	**Maximum pressure drop** (ΔPmax[2]) (Pa)	**Maximum air leakage** (Leakage)[3] (%)
Plate recuperator without bypass			
≤ 15000 m³/h	0,50	200	0,25
> 15000 m³/h	0,55	200	0,25
Plate recuperator with bypass			
≤ 15000 m³/h	0,45	300	0,25
> 15000 m³/h	0,50	300	0,25
Rotary regenerator	0,70	150	5,0
Pipe circuit system – fin regenerator	0,40	200	-
Heat pipe without bypass	0,45	250	0,25
Heat pipe with bypass	0,40	300	0,25

1. At air flow mass ratio 1,0
2. In dry air conditions; with higher heat recovery factors, a higher pressure drop percentage is allowed
3. At pressure difference 400 Pa

Quick specification of air handling unit sizes

Size	A_{TP} (m^2)	V_{TP}* (m^3/h)	V_{FK} (m^3/h)	V_{FT} (m^3/h)	V_{RPDK} (m^3/h)	V_{RPDM} (m^3/h)	V_{RPDG} (m^3/h)
6/3	0,11	1627	2500	2150	2000		2600
9/3	0,19	2694	3750	3225	3000		4100
6/5	0,22	3214	4200	3200	2600	3500	3800
6/6	0,25	3629	5000	4300	2600	3500	3800
9/6	0,42	6010	7500	6450	4100	5500	6000
12/6	0,56	8078	10000	8600	5500	7000	8000
6/9	0,39	5645	7500	6450	4300	6000	5500
9/9	0,62	8862	11250	9675	6800	9000	8500
12/9	0,87	10994	15000	12900	9200	12000	11500
15/9	1,13	14233	18750	16125	11500	15000	15000
18/9	1,40	17685	22500	19350	14000	18000	18000
9/12	0,83	10504	15000	12900	9000	11000	11000
12/12	1,18	14893	20000	17200	12500	15000	15000
15/12	1,53	19282	25000	21500	15500	19000	19000
18/12	1,90	23958	30000	25800	18000	23000	23000
21/12	2,22	27987	35000	30100	21000	26000	26000
12/15	1,49	18818	25000	21500	16000	20000	20000
15/15	1,93	24364	31250	26875	20000	25000	25000
18/15	2,40	30273	37500	32250	24000	30000	30000
21/15	2,81	35364	43750	37625	28000	35000	35000
24/15	3,25	40909	50000	43000	32000	40000	40000
15/18	2,34	29446	37500	32250	22500	28000	28000
18/18	2,86	36038	45000	38700	26500	33000	33000
21/18	3,39	42740	52500	45150	31000	39000	39000
24/18	3,92	49442	60000	51600	36000	45000	45000
27/18	4,48	56474	67500	58050	43000	50000	50000
18/21	3,25	40997	52500	45150			
21/21	3,86	48622	61250	52675			
24/21	4,46	56246	70000	60200			
27/21	5,10	64246	78750	67725			
30/21	5,70	71870	87500	75250			
21/24	2,10	53033	70000	60200			
24/24	2,45	61758	80000	68800			
27/24	2,78	70075	90000	77400			
30/24	3,11	78391	100000	86000			
24/27	2,72	68608	90000	77400			

A_{TP} heat exchanger cross section size

V_{TP} maximum volume air flow rate across heat exchanger (heater, cooler)

V_{FK} maximum volume air flow rate across cartridge filter

V_{FT} maximum volume air flow rate across bag filter

V_{RPDK} maximum volume air flow rate across plate recuperator (low efficiency, pressure drop ~ 300 Pa)

V_{RPDM} maximum volume air flow rate across plate recuperator (medium efficiency, pressure drop ~ 300 Pa)

V_{PLRG} maximum volume air flow rate across plate recuperator (high efficiency, pressure drop ~ 300 Pa)

V_{RR} volume air flow rate across rotary regenerator based on known data

L_1 - unit overall length

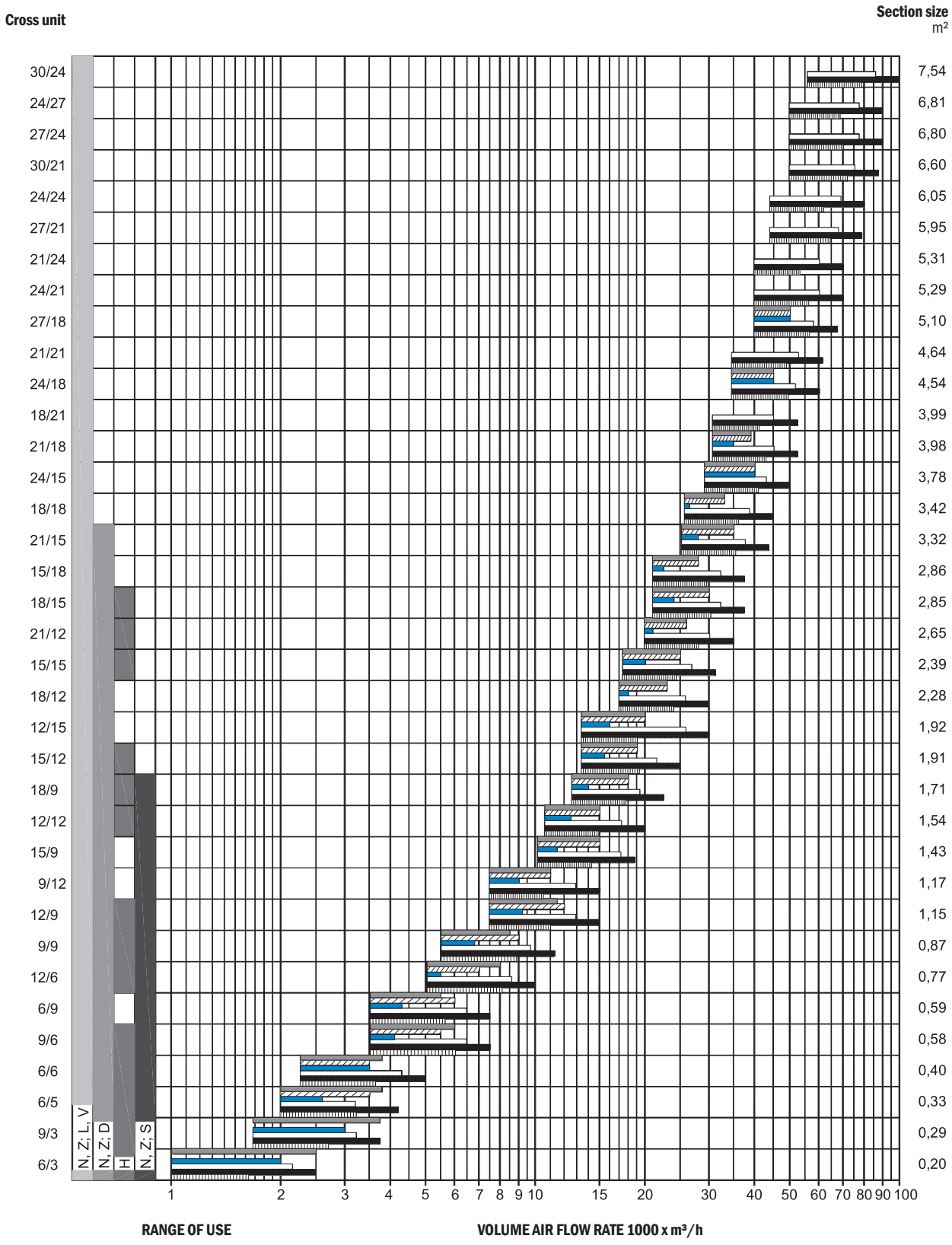
$\varnothing$ - efficiency

Δp_{zuzr} - external air side pressure drop

Δp_{zazr} - waste air side pressure drop

* air intake velocity vzr across cross section ATP:
VTP ≤ 10000 $m^3/h \Rightarrow$ vzr = 4,0 m/s
VTP > 10000 $m^3/h \Rightarrow$ vzr = 3,5 m/s

Quick selection diagram



Legend

- heater, cooler
- cartige filter
- bag filter
- plate recuperator – small
- plate recuperator – medium
- plate recuperator – large

Descriptions and dimensions of functional sections

Fan section

A fan section consists of a section housing, holding components, and a fan with a number of possible drive variants:

- belt driven fan,
- direct driven fan – external rotor electric motor,
- direct driven fan – electronically commutated electric motor with external rotor,
- plug fan (without spiral housing).

The fan with its drive mechanism is mounted on the section housing guides by means of vibration insulators, while on the pressure side it is connected to the housing by means of a flexible duct connection. Such installation prevents the transmission of vibrations to the housing.

In general, the fan section is characterised by the following:

- fan impeller provided with general anti-corrosion protection,
- fan housing made of galvanised steel sheet,
- fan housing in hygienic grade units fitted with condensate drain, and from fan size 400 and above, with cleaning opening,
- fan and motor structural frame made of galvanised steel sheet,
- fan with drive motor can be dismounted from unit housing,
- section fitted with double-wall inspection window and internal lighting,
- section housing fitted with cable sleeves for drive motor power cabling, with unit sizes 6/3 and 9/3, access door fitted with terminal box for drive motor wiring,
- access door protected against unauthorised opening or entry by means of mechanical interlock,
- if no electric control box is in air handling unit close proximity, i.e. within visual field, each unit is fitted with lockable service switch,
- section housing fitted with interior pressure measuring fittings.

Electric motor rated power

The term rated power refers to constant operation according to DIN EN 60034-1, with 50 Hz frequency, 40 °C temperature and at an altitude up to 1000 m. With 60 Hz frequency, the rated power increases in accordance with the correction factors listed below:

Electric motor housing size	Number of poles	Correction factor for 60 Hz operation
56 – 160	2 to 8	1,15
180M – 200L	2	1,12
	4	1,15
	6 and 8	1,2

AC EFF1 and EFF2 motors available. EC motors available.

Degree of protection according to DIN EN 60034-5

The motors are designed for degree of protection IP 55 in accordance with DIN EN 60034-5. (Absolute protection of moving and live parts, protection against harmful dust accumulation and waterspouts.)

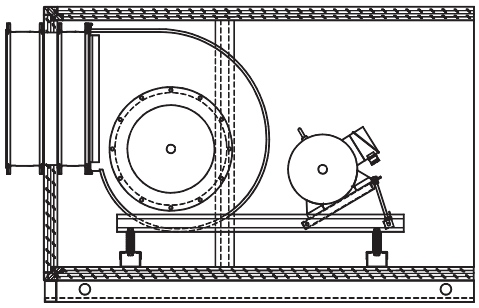
Note: Belt driven fan mechanical safety is ensured by installation inside the unit, which prevents access during fan operation.

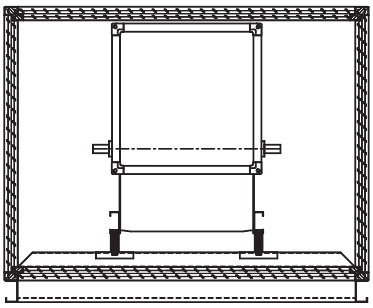
Belt driven fan: VR

The fan is mounted on the structural frame consisting of two longitudinal and two transversal C-profiles. Mounted on the structural frame is also a tensioning plate with an electric motor, which serves for corrective adjustment of belt tension. The electric motor drives the fan via V-belts and pulleys. The fan structural frame is mounted on the unit housing by means of vibration insulators. The flexible duct connection prevents the transfer of fan pressure flange vibrations to the unit housing (picture 15).

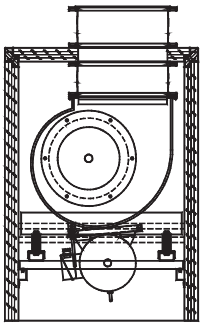
The fan drive electric motors fall into insulation class F; however, at nominal load and nominal tension, insulation temperature does not exceed insulation class B. A stream of air with temperature ranging from -30 °C minimum to +55 °C maximum and humidity ranging from 5 % minimum to 95 % maximum flows across the electric motors installed in the air handling unit.

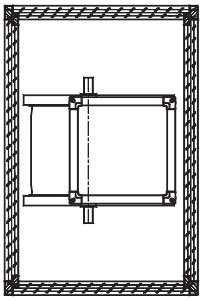
Belt driven fan – horizontal design





Belt driven fan – vertical design



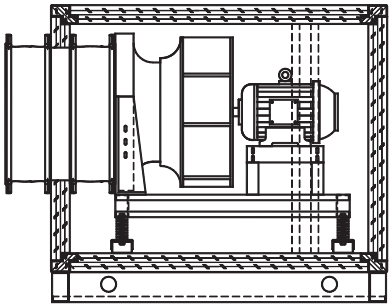


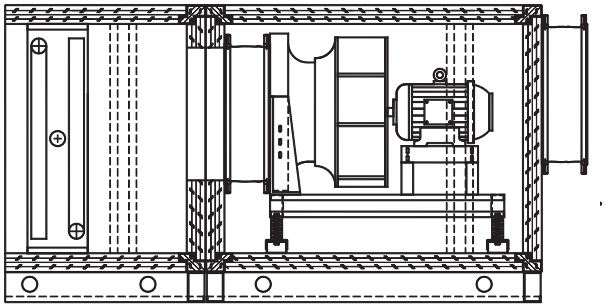
Plug fan: VF

This fan has no spiral housing and is directly driven by an electric motor via its shaft. The electric motor is mounted on the fan frame by a base plate. The fan structural frame is fixed to the unit housing by means of vibration insulators. A flexible duct connection prevents fan pressure flange vibrations from transferring to the unit housing.

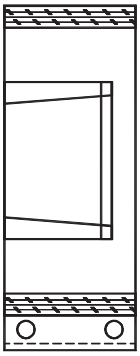
AC and EC motors available.

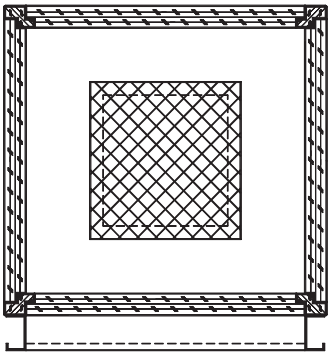
Connection types for plug fan section sizes 6/5 – 24/27:





Diffuser section: D





Heating section

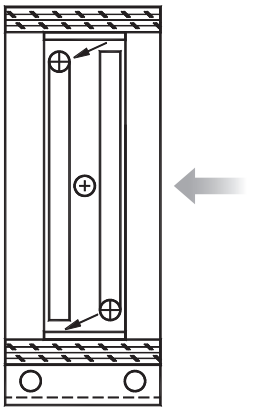
Heating section with water heater: EW

A water heater consists of a frame, fin package, a collection pipe and a distribution pipe. The fin package is formed by copper tubes, to which aluminium fins are joined by means of mechanical expansion. The collection and distribution pipes, which interconnect the fin package tubes, are fitted with an air-bleed and drain valve. The frame protects pipe elbows and serves for mounting the heater in the unit. The collection pipe, distribution pipe and solder joints are protected against corrosion with temperature resistant coating. Every water heater is tested for tightness in a water bath at a test pressure corresponding to the operating pressure.

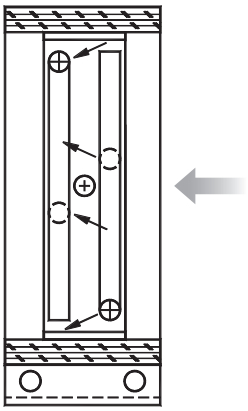
If the water heater has a pre-heating function, there is an anti-freeze protection section (FR) situated behind it.

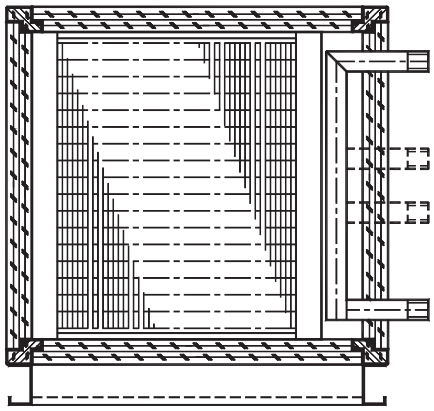
The water heater is mounted in the housing by means of guides allowing its removal in case of defect or damage. Thus, a free area of a width at least 1.3 times the external width of the air handling unit is to be provided at the unit access side.

6/3 ÷ 30/21



21/24 ÷ 24/27





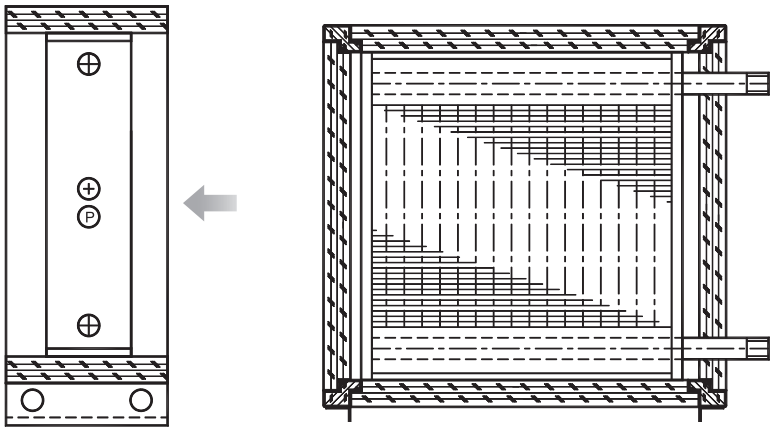
Heating section with steam heater: ED

Steam heater consists of a frame and aluminium fin package, into which copper, collection and distribution pipes are fitted. Aluminium fins and copper pipes are joined by means of mechanical expansion. The collection and distribution pipes, which interconnect the copper pipes, are made of steel and are fitted with a thread or flange connection and an air-bleed and drain valve.

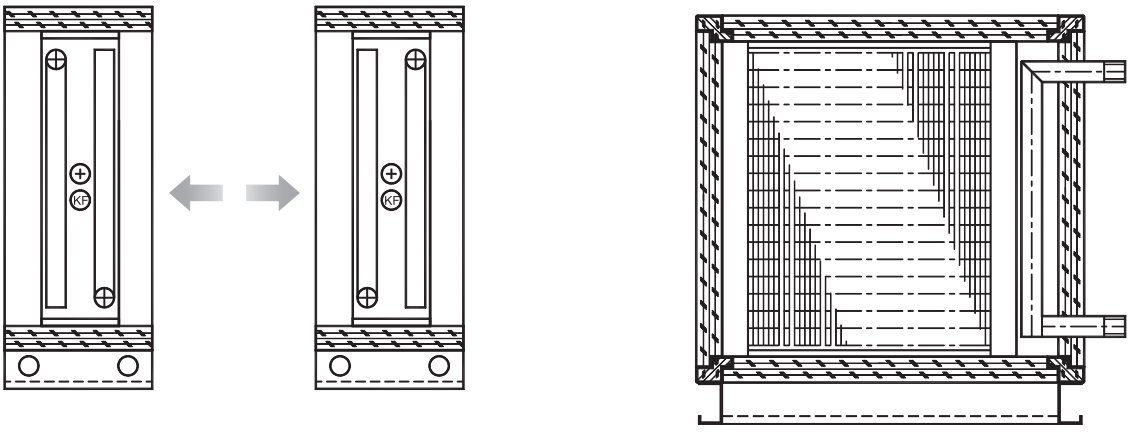
The steam heater frame protects pipe elbows and serves for mounting the heater in the unit. The water heater is fitted into the housing by means of guides allowing easier removal. The collection pipe, distribution pipe and solder joints are protected against corrosion with temperature resistant coating.

Steam heater (GP type): working medium steam, utilizing only saturated steam condensation heat. Serviceable up to 9 bar maximum.

The steam heater is mounted in the housing by means of guides, allowing its removal in case of defect or damage. Thus, a free area of a width at least 1.3 times the external width of the air handling unit is to be provided at the unit access side.



Heating section with condenser: EK

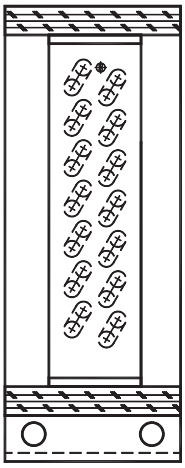


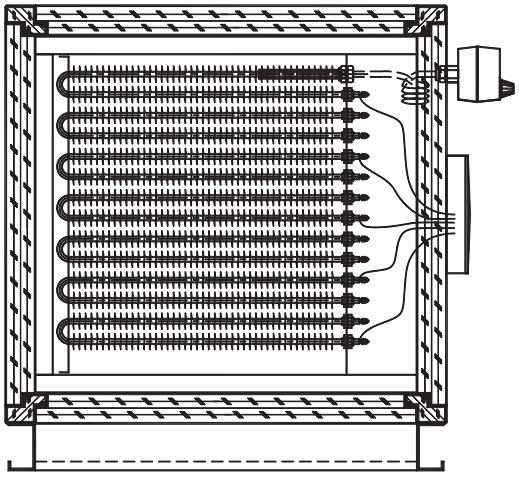
Heating section with electric heater: EE

An electric heater section consists of a section housing, an electric air heater, a protection thermostat and a security temperature sensor.

The electric air heater consists of a galvanised steel sheet frame, electric heating elements (resistors) with stainless steel cooling fins, ABS or polycarbonate terminal box mounted on the outer side of the section cover panel, cable glands, silicon insulated leads and terminals.

The electric heater is mounted in the housing by means of guides allowing its removal in case of defect or damage. Thus, when installing the air handling unit, a free area of a width at least 1.3 times the external width of the air handling unit is to be provided at the unit access side.





Selection and installation guidelines: EE

- The resistors are connected to 3 x 220 V supply voltage, and reach a high surface temperature of ~ 350 °C during operation.
- Air flow velocity through the electric air heater shall not be less than 2 m/s, and air flow shall be evenly distributed across the entire cross section.
- Functional sections with temperature sensitive components shall be separated from the electric heater section with an empty section of no less than 600 mm length.
- If the electric air heater section is installed downstream of the fan section (the fan blowing into the heater), there should be an empty section (with a length of L=(H+B)/2 – H represents air handling unit height, B its width – but in no case less than 600 mm) installed between these two.
- The electric heater shall not be started until the fan has established a sufficient air flow rate.
- After the electric heater switches off, the fan shall continue to operate for an additional 3 to 5 minutes for the heating elements to cool.
- The security temperature sensor and thermostat sensors shall be located in the heater upper area, above the resistors, where, in case of air flow failure, the temperature is highest.
- The electric air heater is not water tight; therefore, this heating section shall not be installed where exposed to water or steam.

Heating section with indirect gas heater: EGI

An indirect gas heater section consists of a section housing and an indirect gas heater.

The basic indirect gas heater section outline, applicable to all indirect gas heater types, is shown in picture.

The indirect gas heater consists of a heat exchanger, a pressure gas burner, a burner (gas) train, and monitoring and safety equipment.

The stainless steel sheet heat exchanger consists of a combustion chamber, coil set, and a collection chamber with a flue gas pipe.

There is a flue gas condensate collection and drain pan fitted below the heat exchanger.

The gas burner is flange-mounted to the combustion chamber opening from the outer (access) side of the section housing, while the flue pipe is routed through the section housing back wall. The declared minimum surrounding temperature for the gas burner normal operation is -15 °C.

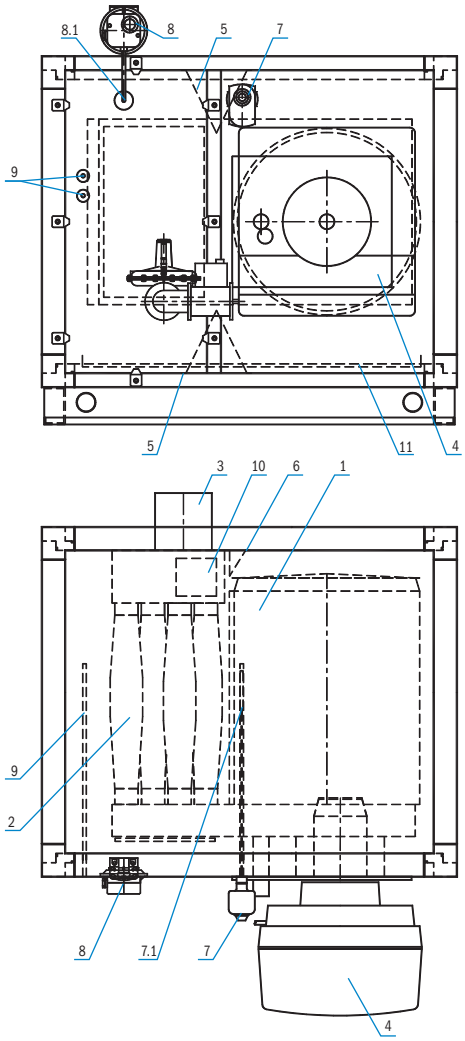
Selection and installation guidelines

- Indirect gas heater section shall always be located in the positive pressure part of the air handling unit – downstream of the supply fan – in order to prevent the supply air and flue gas from mixing in case of heat exchanger damage.
- Predicted on the left and right sides of the gas heater section are empty sections of 600 mm length, with access into the heater section for the purpose of inspection.
- The pan drain line from the section bottom and the gas heater drain line from the section back wall shall be connected to the drainage through a trap and an acid neutralizer.
- The safety pressure switch, safety thermostat and security temperature sensor, and operation thermostat shall always be fitted on the section housing outer side. With outdoor air handling units, these appliances as well as the burner shall be protected with a watertight and thermally insulated protection chamber.
- The gas burner shall be mounted to the combustion chamber opening from the outer side of the section housing by means of flanges, made to a size correspondent to the type and size of the gas burner.
- With indoor air handling units, always ensure sufficient combustion air supply, natural machine room ventilation, and flue gas exhaust.
- With outdoor air handling units, the gas burner is protected from the weather conditions (wind, rain, snow, etc.) with a watertight and thermally insulated protection chamber, the bottom of which has an opening for combustion air supply. The protection chamber has to be of such size as to shield not only the burner, but also the safety pressure switch, safety thermostat and security temperature sensor, and operation thermostat, and to provide enough room (to the left and right of the gas burner) for the gas train installation.
- As regards the design of the flue pipe, consult the competent chimney sweep service. If the supply of a chimney-equipped unit is required, the chimney has to be dimensioned and installed in accordance with the valid laws, regulations and standards. Due to the chimney service approval acquisition, a complete plan (including flue gas condensate drain and neutralisation) is required.
- The flue pipe shall be routed in accordance with the requirements for gas appliances. The pipe-to-chimney joint shall be watertight to prevent any uncontrolled condensate leakage to the environment in case of flue gas condensation.
- The flue pipe does not require natural draught.
- Electric cables shall not be laid inside the section housing. With outdoor air handling units, the cables can be led through the gas burner protection chamber (but shall not hinder the unit access), or laid, upon design engineer and customer agreement, across a free outer surface (back wall, bottom, etc.).
- The gas heater section design shall predict a connection for external air natural access into the interior (cooling purposes). A top or side opening shall be fitted with a spring drive damper and duct-connected to the outside of the building. The damper and duct shall be thermally insulated with non-flammable insulation material. In case of power failure or any other defect which results in sudden interruption of cooling or unit overheating the damper shall open, thus enabling the gas heater natural cooling.
- All electric cables installed inside the housing in the sections left and right to the gas heater unit, as well as cable convections and protection pipes shall be thermally insulated with high temperature resistant insulation.
- For the purpose of outside air filtration, a metal filter with no sealing strip (EPDM) or bottom pan (unless grease is filtered) shall be used.
- For the purpose of vibration and sound insulation between the housing and the fan upstream of the gas heater, use a flexible duct connection (canvas) of high temperature resistant and non-flammable material according to DIN 4102.
- To insulate the vibrations of the fan upstream of the gas heater, use spring vibration insulators.
- For potential equalization of the fan upstream of the gas heater, use a non-insulated Cu conductor.

The volume flow rate of the air passing across the combustion chamber and coil set must never fall below the minimum value required for the cooling of heat exchanger walls. Thus, check the following prior to the section start-up:

- installation and operation of the thermostat provided to monitor and maintain the heat exchanger outlet air temperature within the 50 °C to 60 °C range,
- installation and operation of the bypass damper electric motor drive and its limit switch; in case of power failure or any other defect which results in sudden interruption of cooling or unit overheating the damper must open, thus enabling the gas heater natural cooling.
- Motor-drive-limit-switch-actuated gas burner switch-off or prevention of operation in the event of an 80-percent closure on the part of the damper which controls heat exchanger cooling,
- Installation and operation of the safety air flow rate scale provided for the gas burner switch-off in case of insufficient air flow rate across the heat exchanger,
- operation of the safety pressure switch provided for the gas burner switch-off in case of exceeding overpressure in the combustion chamber,
- installation and operation of the safety thermostat provided for gas burner automatic shut-off if air temperature in the chamber above the heat exchanger exceeds approx. 70 °C,
- installation and operation of the safety thermostat (security temperature sensor) provided to switch-off and block the gas burner if air temperature in the chamber above the heat exchanger exceeds approx. 90 °C; gas burner restart requires manual intervention,
- installation and operation of the time relay provided to ensure prolonged fan operation and to prevent the closing of the part of the bypass damper controlling the air flow rate across the heat exchanger after gas burner switch-off;
- heat exchanger tightness and flue gas exhaust.

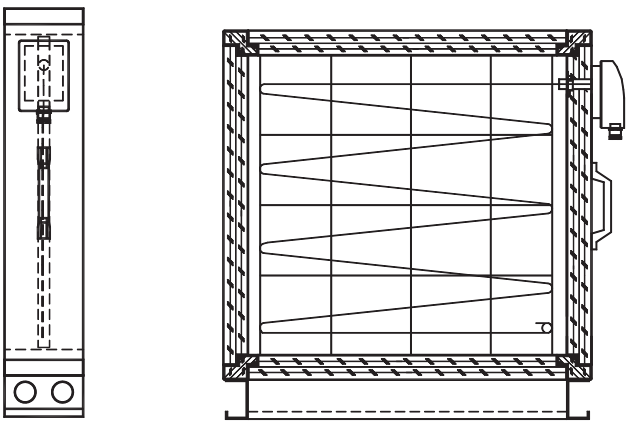
The gas supply connection and burner start-up shall be executed only by authorised and qualified personnel, following the manufacturer's instructions, design specifications and regulations in force.



1. Combustion chamber
2. Coil set
3. Flue pipe
4. Gas burner with heating power continuous (stepless) control
5. Top-to-heater and bottom-to-heater air directing baffle
6. Back-wall-to-heater air directing regulator
7. Safety thermostat – set to 80 °C – and security temperature sensor – set to 90 °C
7.1. Safety thermostats and security temperature sensor
8. Differential pressure switch – with a range up to 500 pa
8.1. Pressure measuring tube
9. Tube for sensor entry (length: 400 mm)
10. Collection chamber condensate drain
11. Pan with bottom drain

Section with anti-freeze protection: FR

The anti-freeze protection device employed is a freeze sensor. With indoor and hygienic grade air handling units, its housing is mounted on the FR section cover panel outer surface, while with outdoor air handling units, on the frame inside the section housing. A 2- or 6-metre capillary tube fixed to the FR frame is evenly routed across the cross section inside the section housing. The FR section frame is fixed to the FR section cover panel and mounted on guides, which allows its removal.



Humidification section

Humidification section with spray humidifier: BLW

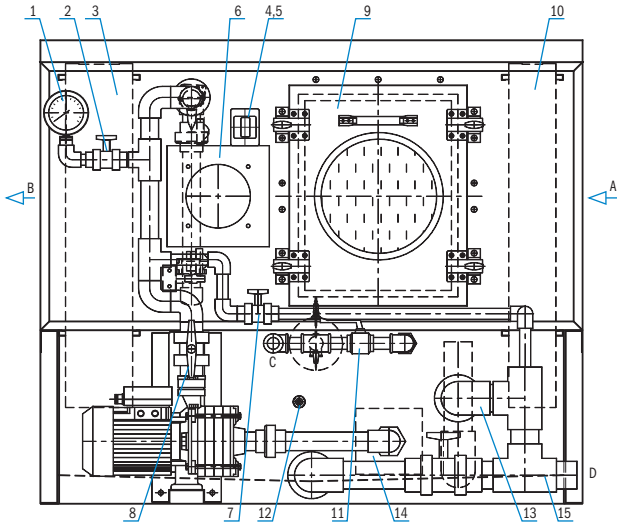
A spray humidifier section consists of a single-wall housing, a pool and other components, all made of steel sheet 1.4301. On request, the housing and pool can be additionally thermally insulated from the outer sides by means of 50 mm thick mineral wool. The whole pool bottom surface leans towards the drain connection, which is situated at the lowest point of the bottom.

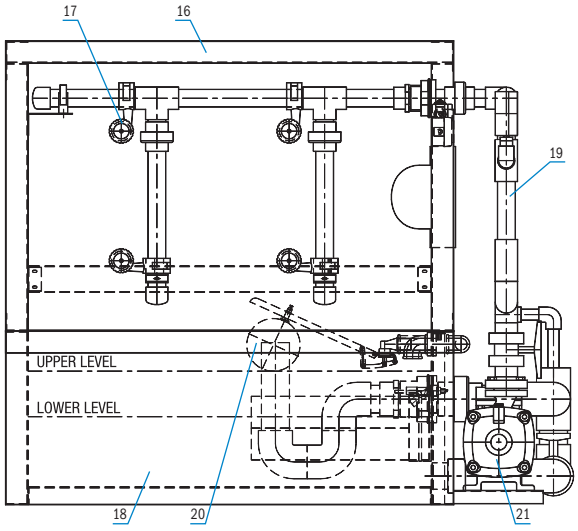
The air flow directing rectifier and droplet eliminator consist of stainless steel frames and polypropylene fins (blades) resistant to temperatures up to +125 °C. For the purpose of cleaning, they can be dismantled from the section housing.

The polyvinyl-chloride (PVC) pipe system consists of a pressure line, internal distribution piping, water spray nozzles, rinse and drain pipes, and a water supply pipe.

The inspection door is fitted with a circular polycarbonate window to allow inspection of the section interior during operation. A shutter covers the window on the outer side, but can be lifted for inspection. A light for the humidification section lighting is fitted on the front panel outer side.

The flanged pump has grey cast iron housing, a brass impeller, and a stainless steel shaft, or, depending on the water quality, can be entirely made of stainless steel. Together with the drive motor, it is mounted on the water container from the outer side by means of support brackets. A level switch prevents dry operation. Larger sections have a load bearing grid installed in the upper part of the water container – above the maximum water level.





1. Manometer in pressure line
2. Stop valve before manometer
3. Droplet eliminator
4. Electric switch
5. Power distribution box
6. Light
7. Manual 2-way valve for rinsing
8. 2-Way valve in pressure line
9. Door with inspection window
10. Air flow directing rectifier
11. Quick water fill valve
12. Level switch – minimum water level maintenance
13. Overflow pipe with trap for $\Delta p \leq 1000$ pa
14. Intake strainer
15. Drain pipe
16. Housing
17. Pressure nozzle
18. Container
19. Pressure distribution piping
20. Ball cock – maximum water level maintenance
21. Pump

A Dry air intake
B Humidified air outlet
C Fresh water supply connection
D Container water drain connection

Water treatment
Higher salt concentrations in spray water, caused by water evaporation (air humidification), increase the risk of excessive precipitation in the humidification section water part and pipes. Out of a number of precipitation preventing methods, an appropriate one should be employed according to the importance of the humidification section operation, and water hardness.

A few water treatment (softening) methods:

- polyphosphate addition,
- ion exchange,
- decarbonisation,
- rinsing,
- occasional lime scale removal.

Polyphosphate addition is relatively favourable for moderately hard water and temperatures lower than 30 °C. Only small quantities of polyphosphates are added, thus not inducing chemical changes, but merely preventing precipitation (hardness stabilisation).

The process of ion exchange in the pool is used with hard water, increased evaporation and higher operating temperatures. In this process, hardness ions compound into salts, which remain dissolved in the water, so the overall salt concentration remains the same. In the process of evaporation, steel and especially copper and aluminium corroding salts remain in the pool in concentrations proportional to the original water hardness. Therefore, pool water must be occasionally or continuously rinsed from the container.

The softened water contains carbonic acid, which is harmful to steel or copper. Therefore, neutralisation with trisodium phosphate is recommended.

Decarbonisation is a procedure similar to ion exchange. In a synthetic resin filter, the carbonates dissolved in the water react with hydrochloric or sulphuric acid, and transform into non-carbonates. The latter remain in the filter, which is an important advantage in comparison with ion exchange.

The softened water still contains carbonic acid, which is then removed in the process of humidifier spraying. What remains in the water is non-carbonates (gypsum), which are significantly less harmful to air handling units than carbonates.

Rinsing is useful in all processes with occasional or continual intake of salt-containing water for the purpose of evaporation or spraying. These processes cause an increase in salt concentration, which is then decreased by flushing the water out of the containers.

The process of water spraying in the humidifier has an additional air-cleansing function; therefore, dust particles are also collected in the water container.

The quantity of rinsing water should be similar to that of supply water for humidification, and can be determined with the following equation:

Quantity of rinsing water:

$$QVS = V_z \cdot (x2 - x1)$$

Q_{VS}	amount of water used for humidification (kg/h),
V_z	amount of air humidified (kg/h),
$(x2 - x1)$	change in air absolute humidity due to humidification (g/kg).

Humidification section with steam humidifier: BD

The steam humidifier section consists of a section housing, a steam humidifier, a condensate collection and drain pan, positive or negative pressure condensate drain trap, an access door with an inspection window, and internal lighting.

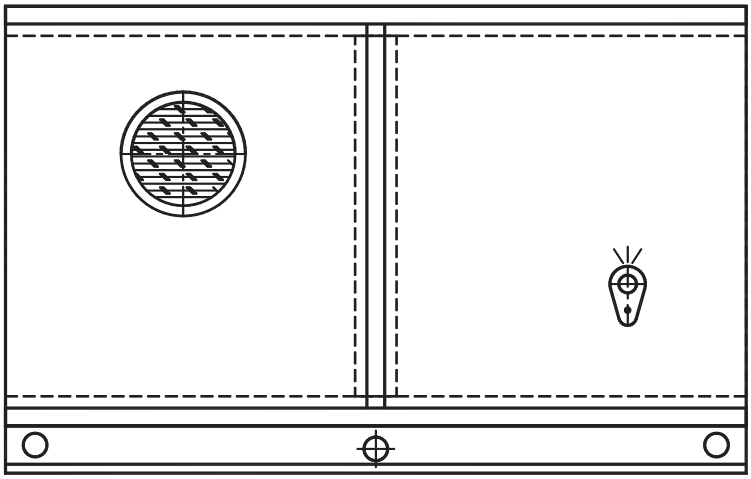
The steam humidifier consists of a steam distributor, which can be directly connected to the negative pressure steam system through a valve, or can be connected to its own steam generator. The steam distributor connection to the generator or negative pressure steam system is established on the outer side of the housing back wall.

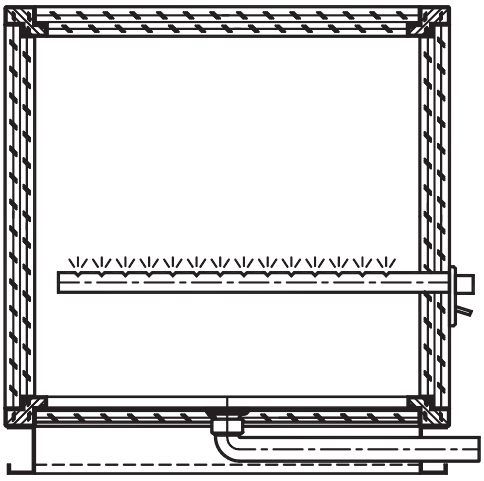
The steam distributor is selected according to humidification requirements and air handling unit size. Its installation according to the manufacturer's instructions ensures relative air humidity rate at the end of the humidification section below 90 %.

Such is the steam distributor installation into the housing that the required surrounding empty space is provided, as well as an adequate length of empty/humidifying space in the air flow direction, and even steam distribution across the air handling unit cross section.

Note: dimensions x and z vary with steam humidifier size and are determined upon order placement. Dimension L in table is informative only; exact dimension is determined in reference to steam humidifier type and size upon order placement.

Section dimensions: BD





Humidification section with honey comb humidifier: BWA

The honey comb humidifier section consists of a section housing, a honey comb humidifier, and a negative or positive pressure condensate drain siphon. It is also fitted with a double-wall inspection window, and internal lighting.

Two honey combhumidifier models FA6 are available:

- honey comb humidifier with circulating water,
- honey comb humidifier with direct water.

A humidification cartridge is made of non-flammable material in a rust resistant housing, and is characterised by its high water absorption capacity (100 litres per 1 m³ material), and large water-to-air-flow honey comb area. The medium is self-cleaning.

Number of cartridges: max. 5 cartridges

Humidification efficiency at 2 m/s air flow velocity:

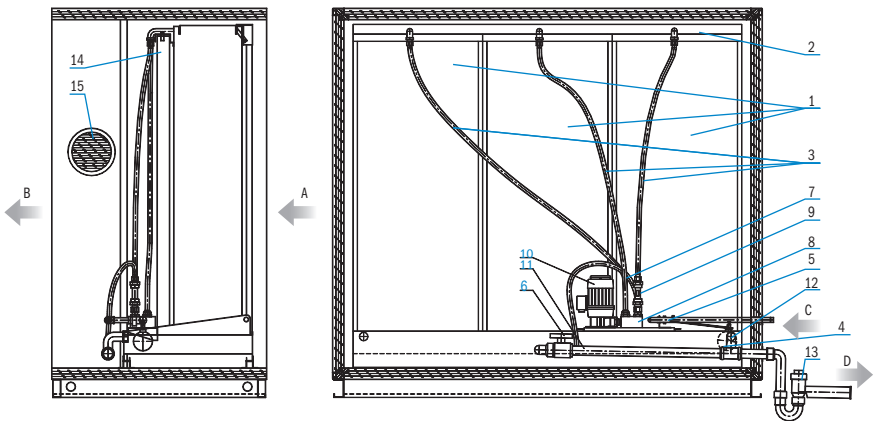
- **65 %** (cartridge thickness 100 mm)
- **85 %** (cartridge thickness 200 mm)
- **95 %** (cartridge thickness 300 mm)

A droplet eliminator is required for every section in which air flow velocity exceeds 3.5 m/s.

A solenoid valve allows water supply control for each cartridge independently (max. 5 cartridges).

Multi-step control is available with both circulating and direct water honey comb humidifier models.

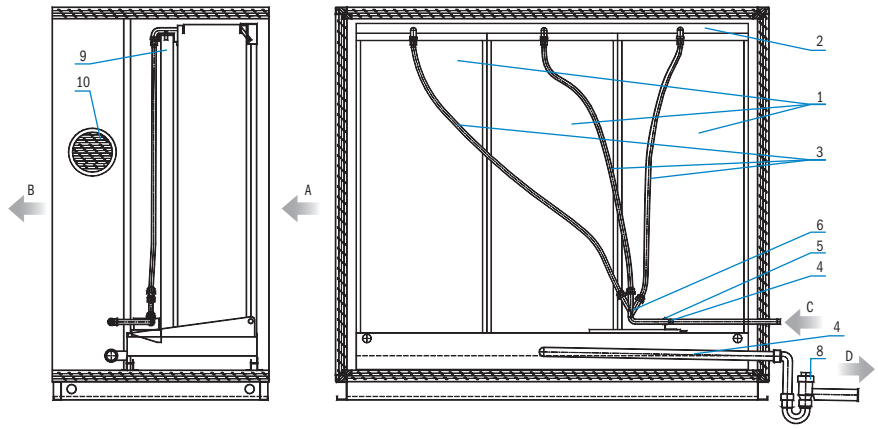
Honey comb humidifier FA6 with circulating water



A Intake air
B Humidified air
C Water supply
D Waste water drain

1. Humidification cartridge
2. Water distribution head
3. Water distribution pipes
4. Float
5. Float-connected valve
6. Valve for tank rinsing
7. Rinse pipe
8. Water distributor
9. Flush control valve
10. Pump
11. Overflow pipe
12. Tank drain and rinse pipe
13. Negative pressure drain trap
14. Droplet eliminator
15. Inspection window

Contact humidifier FA6 with direct water



A Supply air
B Humidified air
C Water supply
D Exhaust water drain

1. Humidification cartridge
2. Water distribution head
3. Water distribution pipes
4. Water distributor
5. Negative pressure drain trap siphon
6. Water distributor
7. Tank drain and flush pipe
8. Constant water flow rate control valve
9. Droplet eliminator
10. Inspection window

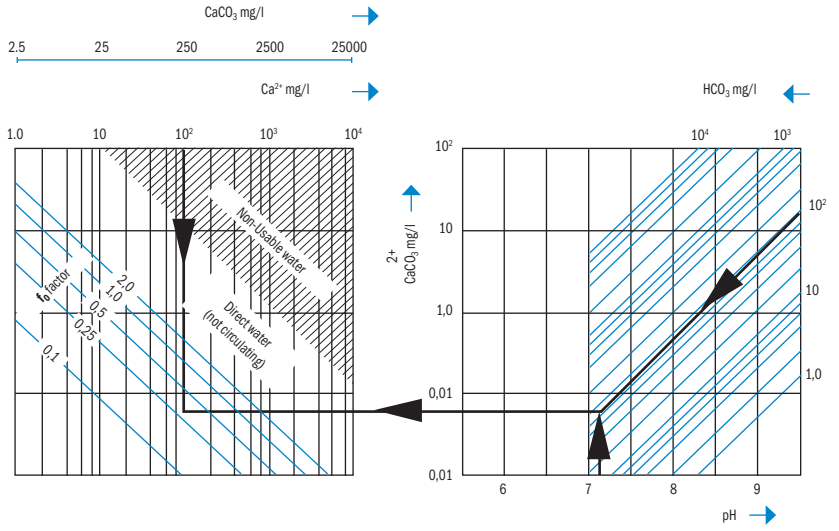
Water consumption

Water circulation system:
Total water consumption equals the sum of absorbed (E) and rinsed (O) water amount.

Flushing the humidification section water tank is necessary for the maintenance of an appropriate level of mineral and salt concentration in the water.

Rinse factor:
With established water quality, the rinse factor (fo) can be determined on the basis of the water quality diagram (picture 46).

If the rinse factor fo value is more than 2, the use of a direct water system or water quality improvement are recommended.



Size	S (l/min) FA6 – 65	FA6 – 85	FA6 – 95
6/6	2,8	4	5,7
9/6	4	5,7	7
12/6	5,7	8	11,4
6/9	2,8	4	5,7
9/9	4	5,7	7
12/9	5,7	8	11,4
15/9	7	9	11,4
18/9	8,8	11,4	16
9/12	5,7	8	11,4
12/12	5,7	8	11,4
15/12	8	9	13,3
18/12	9	11,4	16
21/12	11,4	16	18
12/15*			
15/15	9	11,4	16
18/15	11,4	13,3	16
21/15	11,4	16	18

Size	S (l/min) FA6 – 65	FA6 – 85	FA6 – 95
24/15	13,3	18	■
15/18	9	11,4	16
18/18	11,4	16	18
21/18	13,3	18	■
24/18	16	18	■
27/18	16	■	■
18/21	11,4	16	18
21/21	13,3	18	
24/21	16	23	
27/21	18	■	■
30/21	18	■	■
21/24	16	18	
24/24	16	■	■
27/24	18	■	■
30/24	■	■	■
24/27	16	■	■

* no standard humidifier

■ special construction with increased water drainage capacity required

Calculation example:

V = 2,8 m³/s
pH = 7,1
Calcium concentration
(Ca^{2+}) = 100 mg/l (100 ppm)
Bicarbonate concentration
(HCO_3) = 100 mg/l (100 ppm)
Intake air humidity (x_1) = 2 g/kg
Outlet air humidity (x_2) = 9 g/kg
From water quality diagram (f_0) = 0,3

E = (2,8 x 60 x 1,2 x (9 – 2)) / 1000 =
E = 1,41 l/min

O = 0,3 x 1,41 = 0,42 l/min
S = 1,41 + 0,42 = 1,83 l/min

Total water consumption:

E = (V x 60 x 1,2 x (X2 – X1)) / 1000
O = f0 x E
S = E + O

E	Absorbed water quantity (l/min)
O	Rinsed water quantity (l/min)
S	Total water consumption (l/min)
V	Volume air flow rate (m³/h)
1,2	Standard air density (kg/m³)
X2	Intake air humidity (g/kg)
X1	Outlet air humidity (g/kg)
f0	Rinse factor
60	Conversion from (m³/s) to (m³/min)
1000	Conversion from (g/min) to (l/min)

Installation

At the humidified air outlet, a free space of 300 – 600 mm width shall be provided. Upon installation, all fissures towards the housing must be sealed.

It is required that the air should be filtered with class G3 filters prior to its entrance into the humidifier. If containing organic particles, finer filters can be required.

We recommend the use of class F6 filter according to EN 779 for easier maintenance and better quality.

Water supply with circulating water humidifier:
Water supply connection:

- Stop valve*,
- 500 µm water filter (if water contains coarse particles)*.

The supply water microbiological parameters must correspond to drinking water quality standards and regulations in force.

Water supply with direct water humidifier:
Water supply connection:

- Stop valve*,
- 500 µm water filter (if water contains coarse particles)*,
- Solenoid valve,
- Constant flow rate control valve.

The supply water microbiological parameters must correspond to drinking water quality standards and regulations in force.

Water outlet:
Due to the negative pressure in the humidification section, an adequate negative pressure trap is necessary to allow rinsing.

Control:
Applicable to circulating and direct water humidifiers:

- One-step control*,
- Two-step control*,
- 3-, 4- or max. 5-step control available upon request*,
- External solenoid valve is not supplied with the humidifier.

With multi-step control, there is one less internal solenoid valve than there are regulation steps.

Technical specifications

Supply water requirements

	Circulating water	Direct water
Minimum pressure	500 kPa	150 kPa
Maximum pressure	1000 kPa	1000 kPa
Temperature	0 °C – 40 °C	0 °C – 40 °C

Electromagnetic valve

Voltage (V)	Frequency (Hz)	Power (W)	Current (A)
230	50 – 60	6 – 12	0,10 – 0,21

Pump motor

Pump size*	Voltage (V)±10 %	Frequency (Hz)	Power (W)	Current (A)
1	230/400	50	50	0,26/0,15
2	230/400	50	125	0,38/0,22
3	230/400	50	170	0,75/0,43
4	230/400	50	270	1,10/0,63

Pump motor protection: IP 54, EN 60034
Pump motor insulation: class F

* not part of humidifier standard equipment

High pressure humidifier

A high pressure humidifier is used for adiabatic humidification of inlet air therefore a spray-nozzle system is built in an inlet section of an air handling unit.

Main characteristics are:

- a system is hygienic and harmless to health, certified according to VDI 6022 and other European hygienic standards thus it can also be applied in hospitals,
- humidification efficiency – a relation between actual absorbed water quantity and supplied water quantity – is over 80 %,
- all components are made of stainless steel or plastics thus corrosion resistant.

Main components are:

1. A high pressure pump aggregate with a pump motor with adjustable number of revolutions controlled by a frequency controller and pressure sensor. The aggregate functions with prepared water of different quality. The maximal allowed water hardness is 4 odH (German grades). It can be used softened or demineralised water. The pump does not require any lubrication.

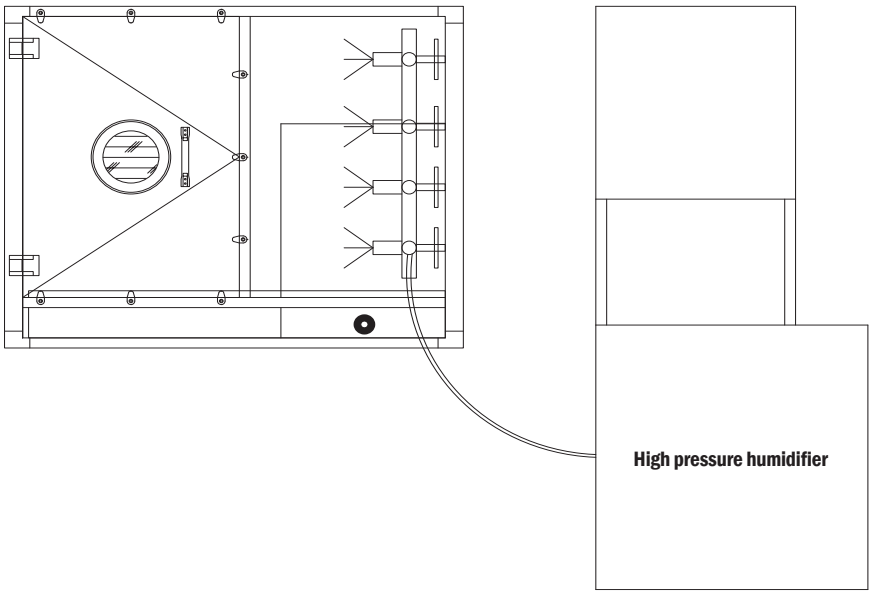
   Basic aggregate data are:

   - sound level; less than 85 dB(A),
   - operating pressure; 70 bar,
   - drive pressure; maximal 4 bar,
   - supply water temperature; from + 3 °C to + 50 °C,
   - ambient temperature; from 0 °C to + 40 °C,
   - storage temperature; from – 25 °C to + 65 °C.

   Protection elements on the aggregate:

   - pressure switch – protection against too low pressure or dry running,
   - temperature controller – protection against overheating,
   - pressure valve – to adjust operating pressure,
   - water filter.

2. Nozzle system consists of:
   - specially designed nozzles in three different capacities
   - pipe system of stainless steel pipes adjusted to the inner dimensions of the air handling units – with a basic module cross section dimension 610 mm
   - high pressure flexible hoses for connection of the pump aggregate and the nozzle system, with corresponding fittings
3. Switch cabinet with drive, protection and control functions. All functions are operated by a preset controller that provides a complete humidification function with 6-step control over 3 valves (binary combination)
4. A drop eliminator, installed at the end of the functional unit, eliminates aerosols from the air flow. This prevents corrosion on the elements installed after this functional unit.



Cooling section

Cooling unit with water cooler: KW

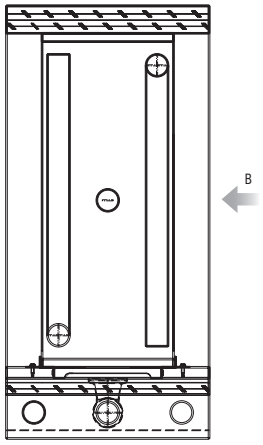
Water cooler section consists of a section housing, a water cooler, a droplet eliminator, a condensate collection pan, and negative or positive pressure drain trap for draining the condensate from the pan. The section housing is described in chapter 4.2.

The basic design of the water cooler section with all the required safety elements is shown in picture 47, and is applicable to all water cooler variants.

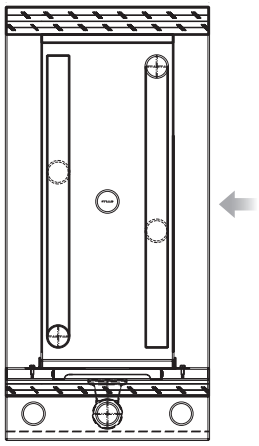
The water cooler consists of a frame, an aluminium fin package with inserted copper tubes, a collection pipe and a distribution pipe. The aluminium fins and copper tubes are jointed by means of mechanical expansion. The collection and distribution pipes, which interconnect the fin package tubes, are made of steel, and are fitted with a thread or flange connection as well as an air bleed and drain valve. The frame protects pipe elbows and serves for mounting the cooler in the unit. The collection pipe, distribution pipe and solder joints are protected against corrosion with temperature resistant coating. Every water cooler is tested for tightness in a water bath at a test pressure corresponding to the operating pressure.

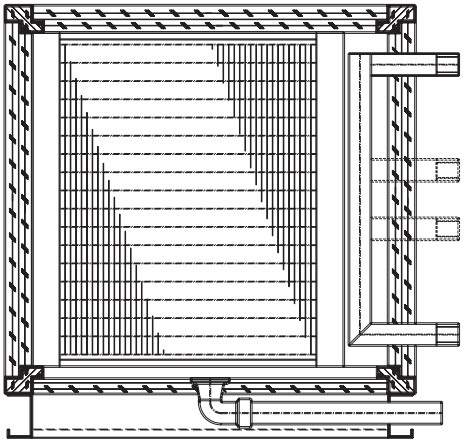
The water heater is mounted in the housing by means of guides allowing its removal in case of defect or damage. Thus, a free area of a width at least 1.3 times the external width of the air handling unit is to be provided at the unit access side.

6/3 ÷ 30/21



21/24 ÷ 24/27





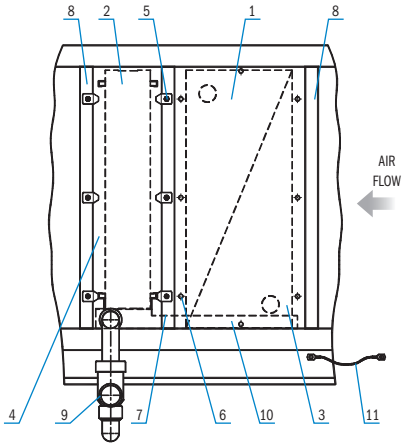
Cooling section with water cooler with droplet eliminator: KW-TA

Droplet eliminator is made of a galvanized steel sheet frame, in which water droplet capturing and eliminating polypropylene fins are arranged at even intervals. It is mounted in the section housing above the condensate collection pan, and can be drawn out of the housing by means of guides. The fins are permanently resistant to temperatures up to 125 °C.

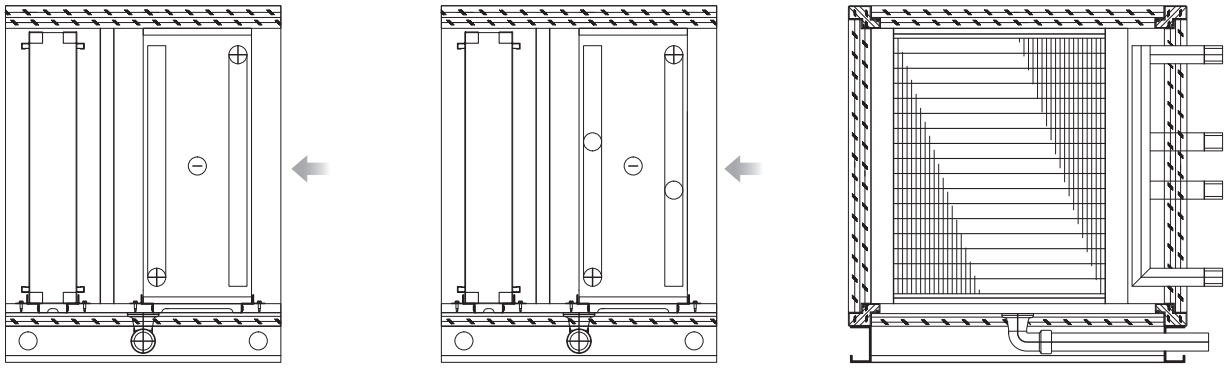
Water droplets in the air flow, which develop due to moisture condensation in the cooler, stop on the eliminator fins and slide into the pan.

The following conditions are required for complete droplet elimination:

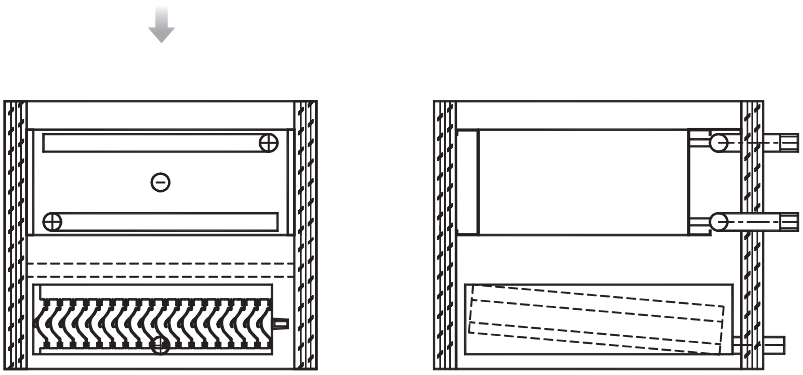
- air flow velocity shall not exceed 4 m/s,
- no tubes (cooling system tubes, cable protection tubes, etc.) shall interfere with the eliminator fins thus causing space widening,
- fins shall have their surfaces cleaned of lime scale and other salt residues. A regular annual inspection of fin cleanliness is required, and when needed, cleaning or eliminator replacement.



1. Water cooler
2. Droplet eliminator
3. Water cooler cover panel
4. Droplet eliminator cover panel
5. Blocker
6. Self-tapping screw
7. Division profile
8. Division or corner profile/section
9. Drain trap
10. Pan
11. Potential equalisation (connection to the next compact section)



Cooling section with droplet eliminator water cooler – vertical design



Drain trap

A drain trap is a pipe which enables condensate drain in case of negative pressure in the air handling unit or individual section, and prevents air leakage through the drain pipe in case of positive pressure in the unit or individual section. It is made of plastic.

A lesser size drain trap installation results in irregular air and water outlet.

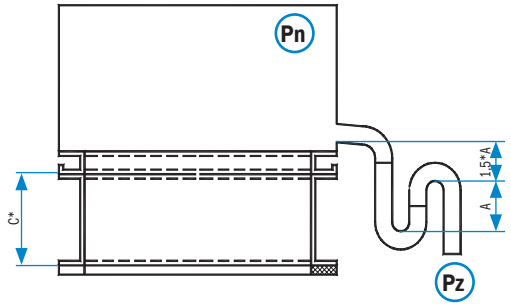
If the height differential between the drain pipe connection point and machine room floor is smaller than the required trap height, the condensate drain shall be routed deep inside the drain crater.

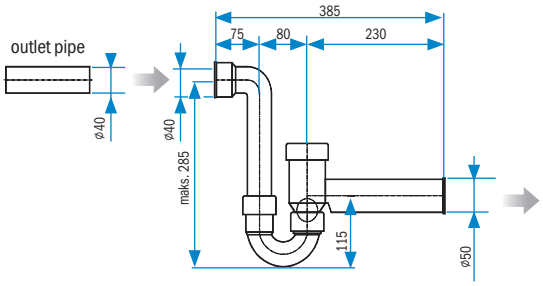
The positive and negative pressure drain trap pipes shall not be directly connected to the drainage. The condensate shall flow freely into a crater-shaped container, and thence into the drainage.

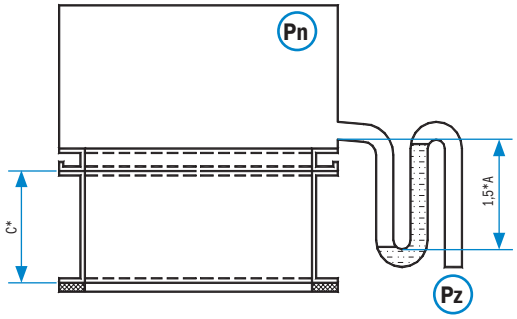
In no case shall a positive and a negative pressure drain trap be connected to the same drain pipe.

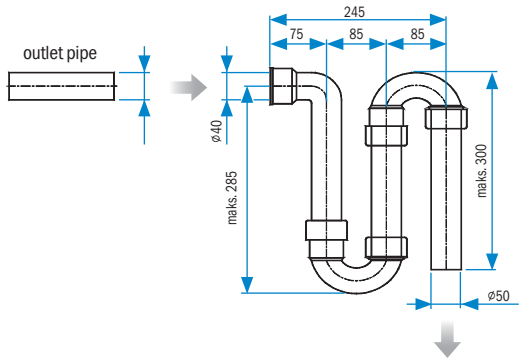
A drain trap shall be fitted on the outer side of the air handling unit. The drain pipes shall have a slope of at least 2 % towards the drain.

Dimension “A” designates total pressure drop in the unit, which can be read from the main unit descriptive plate, or from the fan plate. The read value (in Pa) should be divided by 10 to obtain dimension “A” in millimetres.









C* The required base height for trap proper operation.
It is necessary that water should be poured into the drain trap before the unit start-up, as well as before the cooling section start-up at the beginning of every summer season.

If using an HIDRIA IMP KLIMA negative pressure trap (picture 50), there is no need to fill it with water, as it fills itself when condensate starts producing.

If using a positive pressure drain trap water filling is required.

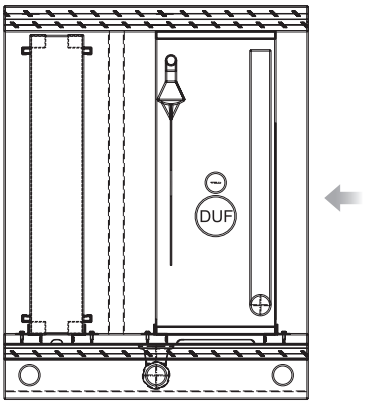
Pressure differential between air handling unit and atmosphere Δp (Pa):

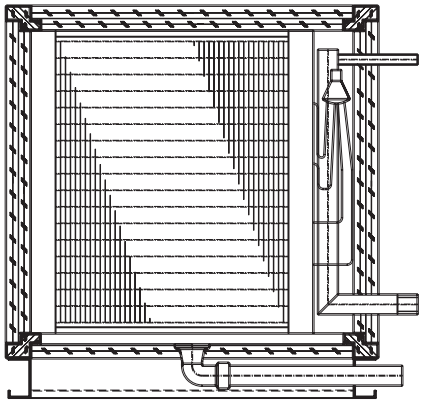
Δp = pn – pz
pn = unit pressure
pz = atmospheric pressure

Possible situations:

Δp < 0	negative pressure in unit,
Δp = 0	unit pressure equal to atmospheric pressure,
Δp > 0	positive pressure in unit.

Cooling section with direct evaporator: KD

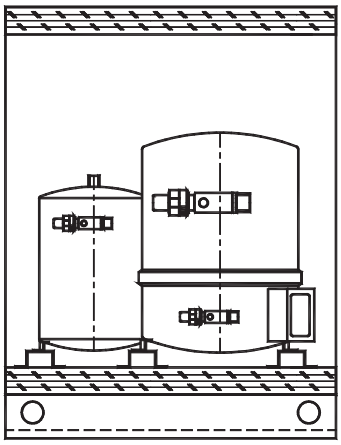




Cooling section with direct evaporator with droplet eliminator: KT-DA
Direct cooler (DUF) consists of a frame, aluminium fin package with inserted copper tubes, a collection pipe, and a distribution pipe. The aluminium fins and copper tubes are jointed by means of mechanical expansion. The collection and distribution pipes, which interconnect the fin package tubes, are made of steel, and are fitted with a thread or flange connection as well as an air leak and drain valve. The frame protects pipe elbows and serves for mounting the evaporator in the unit. The direct evaporator is mounted in the section housing by means of guides, which allows easier removal. The collection pipe, distribution pipe and solder joints are protected against corrosion with temperature resistant coating. Every direct evaporator is tested for tightness in a water bath at a test pressure corresponding to the operating pressure. The direct evaporator cools the air by means of a Freon based cooling agent (R 22 or alternative agents R 134a, R 407c, R 404a). If required, a direct evaporator can be divided into two or more cooling circuits.

Installation and start-up
Direct evaporator is mounted in the housing by means of guides allowing its removal in case of defect or damage. Thus, a free area of a width at least 1.3 times the external width of the air handling unit is to be provided at the unit access side.

Compressor section: KO



The compressor section consists of a section housing, one or two compressors and their respective cooling circuit components, a condensate collection pan, and a negative or positive pressure drain trap for draining the condensate from the pan. It may be designed as an independent section or as part of another section, such as a mixing section, short diffuser section, plate recuperator section, etc.

Installation and start-up
Together with its pertaining elements, the compressor is installed into the housing by means of guides, under which a drain fitted pan is placed across the entire length. The section always contains an access door with an inspection window, and an internal light. A free area of a width at least 1.3 times the external width of the air handling unit is to be provided at the unit access side.

See also the instructions in chapter 7.10, and the part of these instructions discussing air handling unit safe use, start-up and maintenance.

Filter section

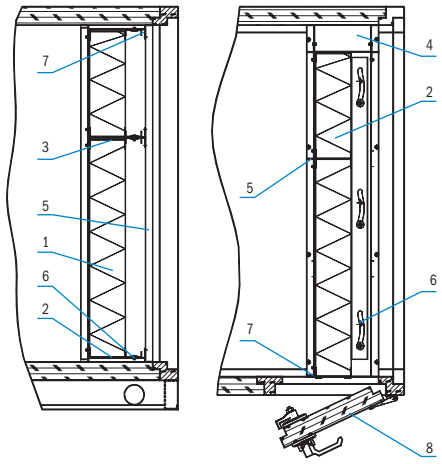
Cartridge filter section

A cartridge filter consists of a galvanized sheet steel frame of 100 mm width with an inserted zigzag filter medium made of synthetic resin reinforced synthetic fibres, and armoured with galvanized steel wire. A cartridge filter is detachably installed into the structural frame, and sealed with sealing strip. The structural frame is fixedly mounted in the section housing, and sealed against the housing with permanently elastic putty. Filter mediums are resistant to temperatures up to 90 to 100 °C, the exact temperature range being stated by respective manufacturers.

Initial and recommended final pressure drop values

Filtration class	L (mm)	V_n (m/s)	A_m (%)	Δp_z (Pa)	Δp_k (Pa)
G3	100	3,7	88	62	250
G4	100	3,7	94	67	250

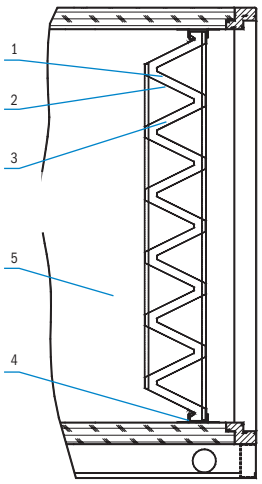
V_n air intake velocity
Δp_z initial pressure drop
L cartridge length
A_m average synthetic dust removal degree
Δp_k recommended final pressure drop



1. Cartridge filter
2. Guide
3. Intermediate guide
4. Restriction tool
5. Intermediate guide support
6. Closure
7. Sealing strip 19 x 5 mm
8. Door

Zigzag filter section: FZ

A zigzag filter consists of a zigzag shaped two-piece dismountable galvanized sheet steel structural frame, and a G3 or G4 filtration class synthetic resin reinforced synthetic fibre filter medium. Filter mediums are resistant to temperatures up to 90 to 100 °C, the exact temperature range being determined by respective manufacturers.



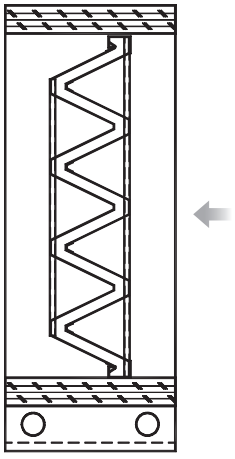
1. Supporting frame part
2. Closing frame part
3. Filter medium
4. Guide
5. Access door

Initial and recommended final pressure drop values

Filtration class	L (mm)	V (m/s)	A_m (%)	Δp_z (Pa)	Δp_k (Pa)
G3	150	1,5	85	33	200
G4	150	1,2	90	36	250

V air intake velocity to filter surface
Δp_z initial pressure drop
L filter length
A_m average synthetic dust removal degree
Δp_k recommended final pressure drop

Filtration class G3 – G4 according to DIN EN 779

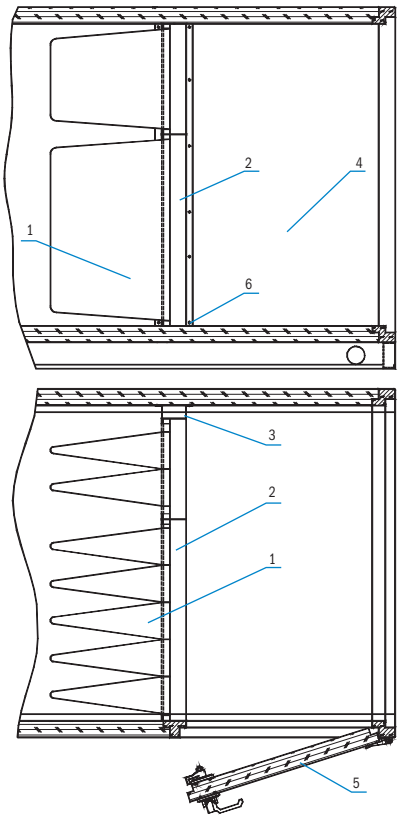


Bag filter section: FT

A bag filter consists of a galvanized steel sheet frame mounted with filter medium.

The filter medium is clamped to the bag filter frame by means of special detachable wire spring clamps. The bag filter structural frame is fixedly mounted in the section housing and sealed against it with permanently elastic putty.

G3 or G4 filtration class bag filter mediums are synthetic resin reinforced synthetic fibre bags of 360 mm length, with temperature ratings up to ≈ 100 °C. F5 to F9 filtration class bag filter mediums are synthetic resin reinforced glass fibre bags of 600 mm length, with temperature ratings up to ≈ 90 °C. The exact temperature resistance range is determined by respective manufacturers.

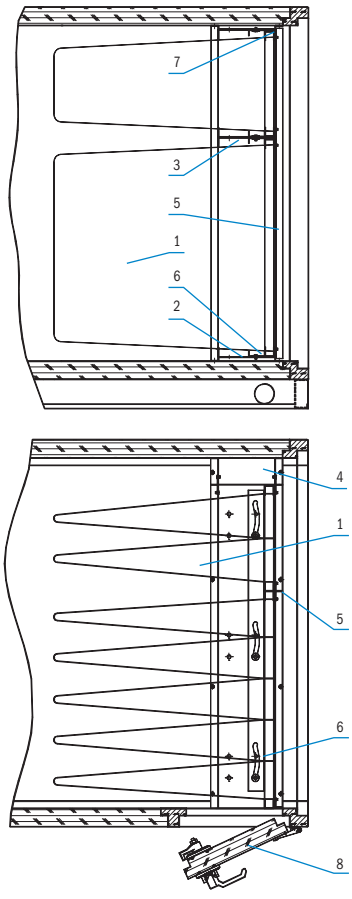


1. Bag filter
2. Bag filter frame with sealing strip and spring clamps
3. Frame restrictor
4. Empty space for bag filter removal
5. Door
6. Self-tapping screw

Bag filter section: FTT

A bag filter consists of a galvanized sheet steel frame mounted with a filter medium.

This filter section has a door on the access side, through which bag filters are detachably installed into the structural frame and sealed with sealing strip. The structural frame is fixedly mounted in the section housing, and sealed against the housing with permanently elastic sealing.



1. Bag filter
2. Guide
3. Intermediate guide
4. Restrictor
5. Intermediate guide support
6. Closure
7. Sealing strip 19 x 5 mm
8. Door

Metal filter section: FM

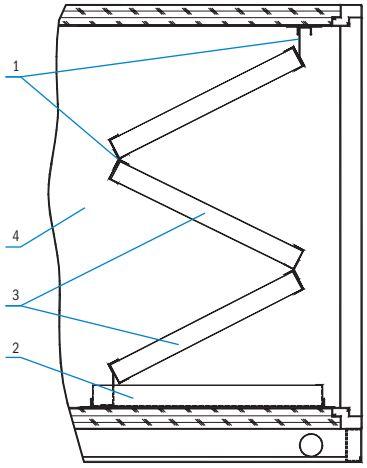
Metal filter consists of a 47 mm wide galvanized steel sheet structural frame with an inserted G2 or G3 filtration class filter medium of a combination of wavy sheet steel netting and expanded sheet steel protection grille. Both filter medium face surfaces are protected with a protection grille. The metal filter material may be galvanized steel, stainless steel, or aluminium.

The metal filter is mounted in the filter frame, and can be drawn out for replacement. The air flow presses the filter cartridges against the frame with glued sealing strip. Large size sections with several cartridges in a set have the cartridges leaning against one another. The cartridge contacts are not sealed with sealing strip. This filtration method is only suitable for very coarse air filtration.

Initial and recommended final pressure drop values

Model	Filtration class	L (mm)	V_n (m/s)	A_m (%)	Δp_z (Pa)	Δp_k (Pa)
Meta Net	G2	47	2,5	70 – 75	14	130
HV 2000	G3	48	2,5	80 – 85	25	130

V_n air intake velocity
Δp_z initial pressure drop
L cartridge length
A_m average synthetic dust removal efficiency
Δp_k recommended final pressure drop



1. Structural frame
2. Pan
3. Metal filter
4. Access door

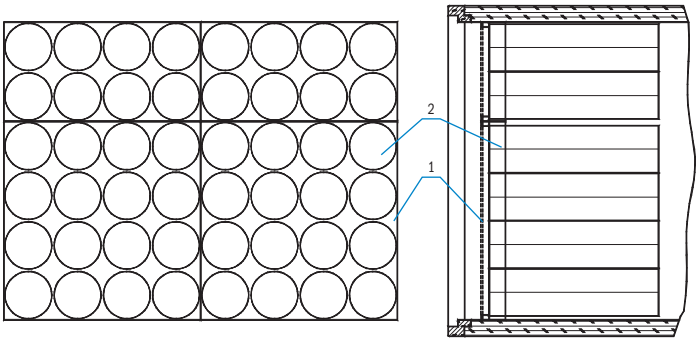
Activated carbon filter section: FAK

An activated carbon filter consists of a galvanized sheet steel base plate and cylindrical activated carbon cartridges. A cartridge consists of an inner and an outer perforated galvanized sheet steel cylinder with activated carbon filled interspace. The inner and outer cylinders are screwed together by means of a locking ring, and joined to the base plate by means of a mortise joint ensuring contact tightness. The cartridge-to-base-plate joint is secured by means of special bolts.

The activated carbon filter base plate is fixedly and air-tightly installed in the filter frame. The filter frame is mechanically mounted in the section housing and sealed with permanently elastic sealing.

To replace a filter cartridge, rotate it in the arrow direction and pull it from the base plate. A new cartridge is inserted in the opposite order and direction.

Activated carbon filters of rust resistant materials are available as well.



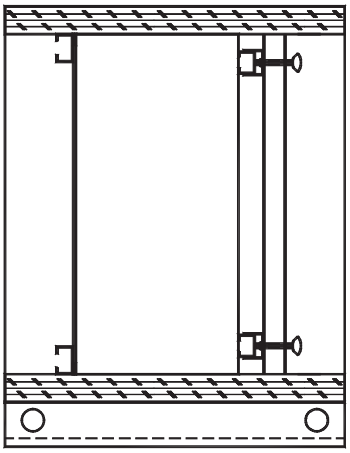
1. base plate
2. filter plate

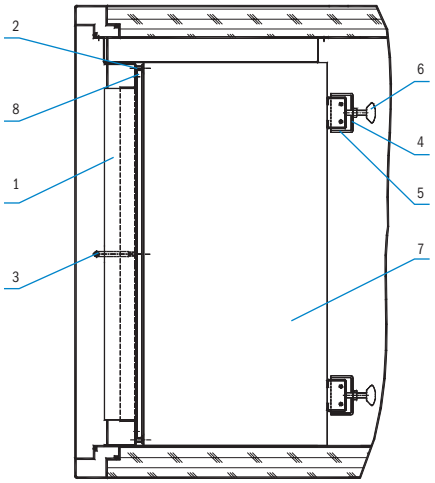
Absolute filter section: FA

An absolute filter consists of a structural frame and a H10 to U17 filtration class filter medium.

An absolute filter is mounted on the filter structural frame by means of a dismountable screw joint. The filter housing is pressed against the sealing strip glued to the filter structural frame. The joint between the filter frame and section housing is sealed with permanently elastic sealing.

Filtration class H10 – U18 according to DIN EN 779





1. Filter structural frame
2. Air-tightness test channel
3. Pressure measurement tool
4. Structural profile
5. Sealing profile
6. Screw
7. Absolute filter
8. Absolute filter sealing strip

Sound attenuation section

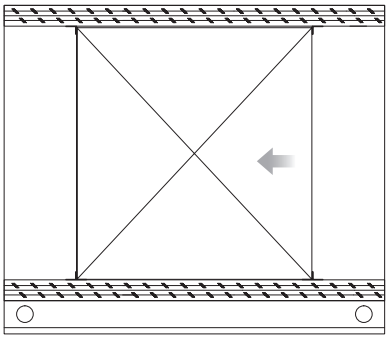
Sound attenuation section: S

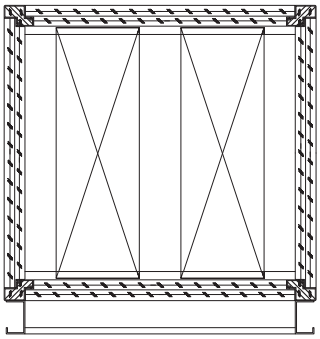
A sound attenuation section consists of a section housing and sound attenuation screens.

Sound attenuation screen
An attenuation screen consists of a galvanized stainless sheet steel outer frame with mineral wool filling. Maximum air flow velocity allowed across the screens is 15 m/s. Special air handling unit design (hygienic grade, pool type) screens, which require high air humidity resistance, have their noise attenuation surfaces additionally protected with polyethylene foil, which is in turn protected against tearing with galvanized steel mesh. Attenuation screens are individually removable from the housing.

Installation
To ensure uniform air flow across the attenuation screens, empty (settling) space should be provided up- and downstream of the screens. If the sound attenuation section is located downstream of the fan section (the fan blowing towards the screens), this requirement is properly fulfilled by installing an interlocated diffuser section. If the up- or downstream duct connection does not cover the entire cross section, the settling space is to be provided by means of an empty section, the length of which depends on the air flow angle:

- from duct connection to screens – inflow angle 35°,
- from screens to duct connection – outflow angle 25°.





Heat recovery section

Recuperation section with fin recuperator – heater: RKE

A fin recuperator section consists of a section housing and a fin recuperator, which consists of an outlet air water cooler, an intake air water heater, and a pipe system.

The air handling unit air outlet and air intake parts may be separate or combined in one air handling unit.

The fin recuperator consists of two fin heat exchangers, interconnected by a pipe system with a circulation pump. One of the heat exchangers functions as a cooler in the exhaust air flow part, and the other as a heater in the supply air flow part.

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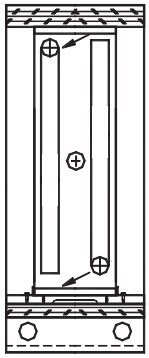

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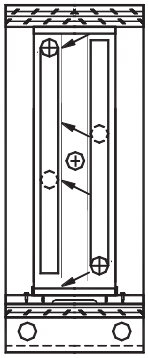

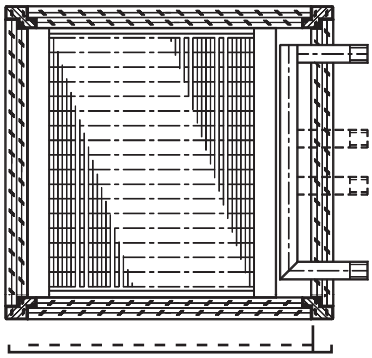

Pipe connection dimensions depend on individual air handling unit sizes and other input parameters.

Recuperation section with fin recuperator – cooler: RKK

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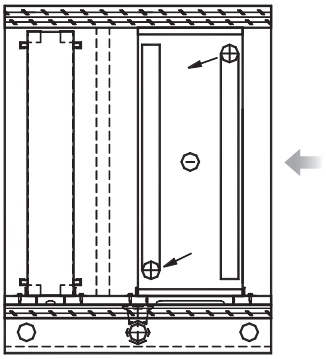

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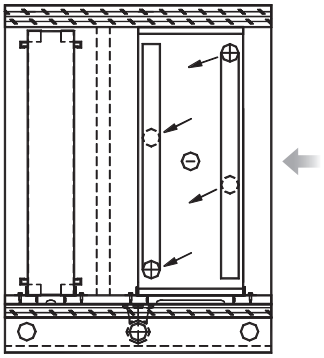
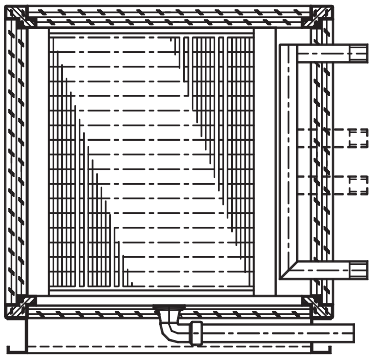




Recuperation section with plate recuperator – diagonal design – with droplet eliminator and cartridge filter: RPD_-TA-FK

A plate recuperator section consists of a section housing, a plate recuperator, a bypass damper, a droplet eliminator, a cartridge filter at outside/fresh air inlet, and other components.

The recuperator is installed into the housing in a diagonal position. The droplet eliminator is installed at exhaust air outlet where air flow velocity reaches vef > 2.0 m/s. At the access side of the housing bottom, a condensate drain connection is predicted.

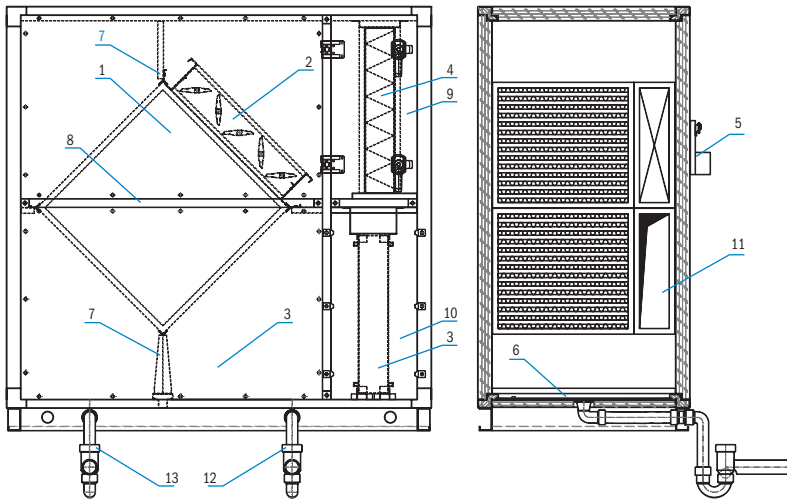
As the recuperator becomes dirty, pressure drop increases and efficiency lowers, which is why an EU3 filtration class cartridge filter is predicted at fresh air inlet of the standard systems. If necessary, an adequate filter can also be installed at exhaust air intake into the recuperator, especially when the air is polluted with dust or sticky particles.

A plate recuperator is a heat exchanger which transfers heat from the exhaust air flow to the fresh air flow directly, through a separation wall, i.e. without a heat transfer medium. It consists of flat aluminium plates providing the structure with stability. Supply air and exhaust air pass through the recuperator in counterflow. Air leakage between the exhaust and supply air flows amounts to up to 1 % of the nominal air flow rate value, with pressure differential 1000 Pa. Picture 68 shows an indoor variant of the plate recuperator.

The recuperator ensures a full transfer of condensation (latent) heat from the exhaust to the supply air without directly transferring the moisture. In dry operation, its thermal efficiency is up to η2 = 65 %, and when recovering condensation heat, the efficiency percentage can be even higher. The recuperator maximum operational temperature is +120 °C. For the purpose of power control and anti-freeze protection, the recuperator is fitted with an air bypass installed within the air handling unit. The bypass is located on the fresh air side and is fitted with counter-direction operating dampers.

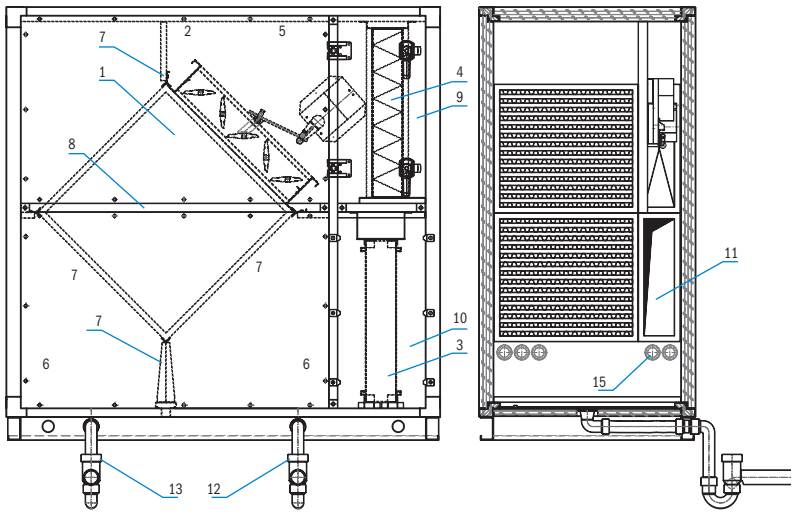
The recuperator also provides transitional season heating power control, summer season cooling power control, and anti-freezing protection. The latter is achieved by opening the bypass and thus reducing the fresh air flow rate through the recuperator to prevent the humid exhaust air from cooling below the freezing point and forming ice crystals, which would result in increased pressure drop and reduced unit efficiency.

Indoor plate recuperator version



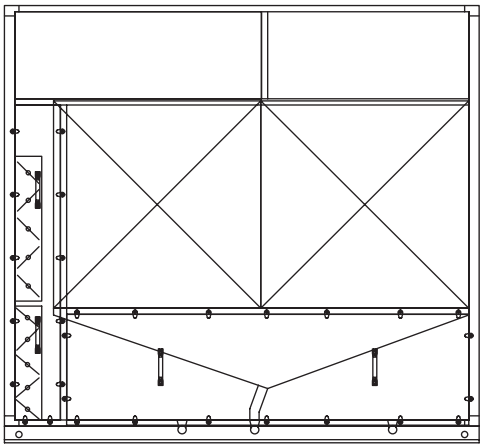
1. Plate recuperator
2. Bypass damper
3. Droplet eliminator
4. Filter (with filter-equipped section)
5. Motor drive
6. Condensate collection and drain pan
7. Internal separation walls
8. Dismountable division profile
9. Door with handles and hinges
10. Cover panel with locks
11. Bypass
12. Positive pressure drain trap
13. Negative pressure drain trap

Outdoor plate recuperator version



1. Plate recuperator
2. Bypass damper
3. Droplet eliminator
4. Filter (with filter equipped section)
5. Motor drive
6. Condensate collection and drain pan
7. Internal separation walls
8. Dismountable division profile
9. Door with handles and hinges
10. Cover panel with locks
11. Bypass
12. Positive pressure drain trap
13. Negative pressure drain trap
14. Damper-to-motor-drive connection mechanism
15. Rubber sealings

Recuperation section with double plate heat exchanger RPBD



The same application as with an usual plate heat exchanger, and additionally offering the following:

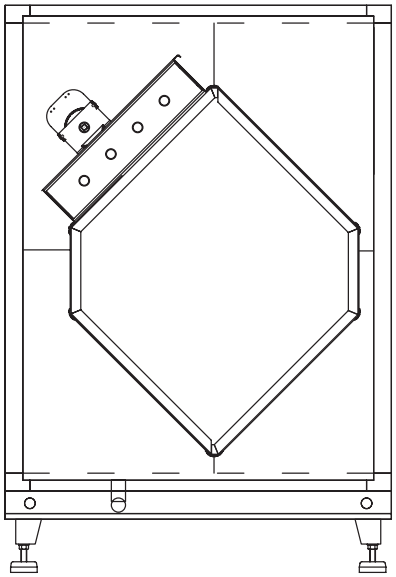
- recovery of a sensible heat from the outlet to the inlet (fresh) air flow, recovery efficiency over 80 %,
- practically absolute separation of the inlet air flow from the outlet air flow.

It consists of:

- A filler from the specially shaped flat plates made of aluminium that can be epoxy coated upon customer's request. Different plate spacing enables selection of the appropriate plate heat exchanger concerning the heat conductivity efficiency and the required pressure difference through the plate heat exchanger. Specially formed end connections of two plates guarantee the appropriate tightness between both air flows.
- Side panels of galvanized steel sheet that can be epoxy coated upon customer's request and additional connection corner profiles.

As a standard offer, there are by-pass louvre dampers for control of heat capacity in the transitional seasons – free cooling – and a frost protection in the winter.

Recuperation section with counter flow heat exchanger RPDC



It enables the following:

- Recovery of a sensible heat from the outlet to the inlet (fresh) air flow, recovery efficiency over 90 %.
- Practically absolute separation of the inlet air flow from the outlet air flow.

It consists of:

- a filler from the specially shaped flat plates made of aluminium that can be epoxy coated upon customer's request.
- Side panel of galvanized steel sheet that can be epoxy coated upon customer's request and additional connection corner profiles.

Recuperation section with rotary recuperator – encased type: RRG

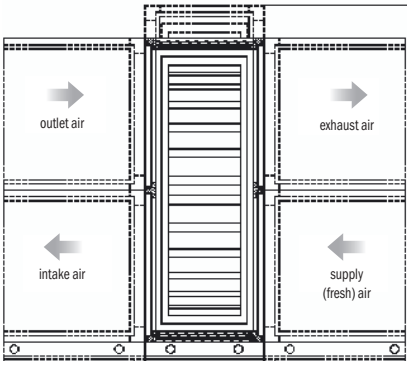
The rotary recuperator section is available in two designs:

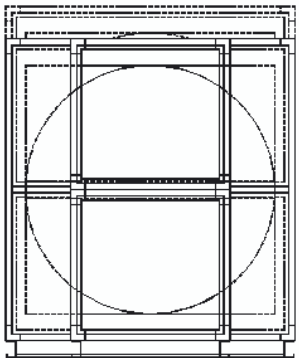
- flanged type,
- encased type.

The flanged type of a rotary recuperator section consists of a rotary regenerative heat exchanger (rototherm) and a properly sized connection chamber on either side (upstream and downstream) of the recuperator. Connection chambers, essentially empty sections with or without access doors, short diffuser sections, or mixing sections with one or two dampers, serve for even air distribution to and from the recuperator wheel. The rotary recuperator is flange-mounted to the connection chambers and is not thermally or acoustically insulated.

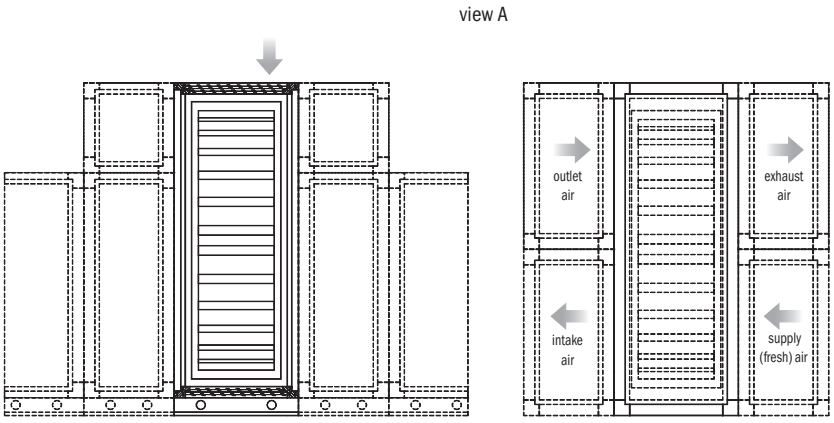
The encased type of a rotary recuperator consists of a section housing and a rotary regenerative heat exchanger (rototherm). The rotary recuperator is installed into the section housing, from which it can be removed in one piece, or, in case of large sections, by segments.

Two-stage design



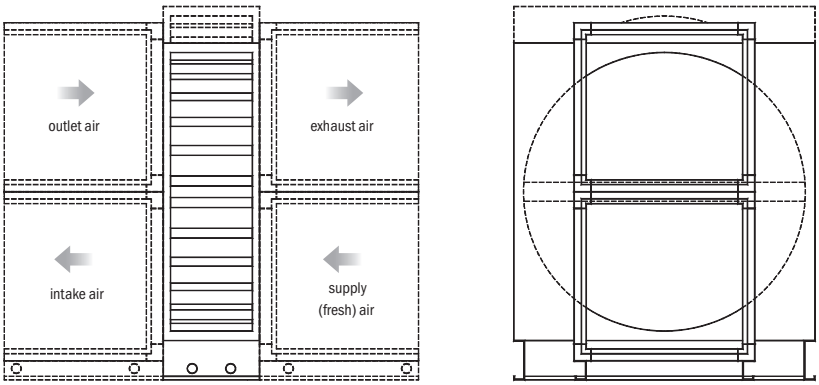


Parallel design

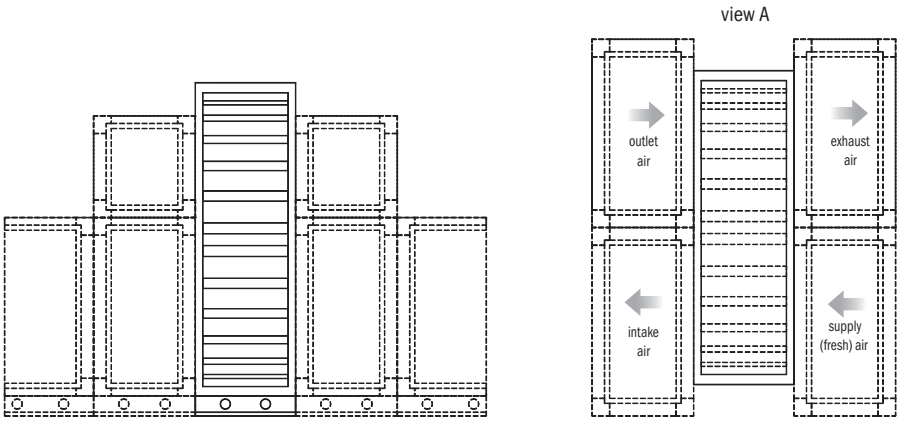


Recuperation section with rotary recuperator – flanged type: RRF

Two-stage design



Parallel design



Explosion proof air handling unit type

Explosion proof air handling unit type

This chapter contains the solutions and instructions regarding explosion safety; in other aspects the above descriptions and instructions (depending on the air handling unit type – indoor, outdoor, hygienic grade, pool, etc.) apply to these units as well.

The explosion proof air handling units correspond to the following categories: equipment group II, equipment category 2, explosive atmosphere caused by gasses, vapours and mists G, temperature classes T3 and/or T4.

An air handling unit marked  II 2 G is suitable for operation in zones 1 and 2.

An air handling unit marked  II 3 G is suitable for operation in zone 2.

An explosion proof air handling unit shall be installed and shall operate only in an explosive atmosphere zone, and under such conditions for which it was designed.

Air handling unit description

Air handling unit housing

For the sake of explosion safety, all unit section parts are grounded to the base, and all joints between the inner and outer housing panel walls are electroconductive. In addition, all doors and removable cover panels are connected to the housing frame by means of grounding connections. The housing tightness is class B according to SIST EN 1886. For the prevention of uncontrolled opening, all doors with hinges and handles are fitted with mechanical blocks, which can only be removed by means of tools.

Flexible duct connections

The flexible parts of these connections are made of electroconductive material. Both flexible connection frames are connected with a grounding connection.

Fan with drive

The fan is entirely manufactured as explosion proof. Its drive is connected to the housing frame by a grounding connection.

The electric motor wiring shall only be executed by a qualified and authorised person, in accordance with the corresponding circuit diagram. The same applies for all maintenance operations.In case of belt replacement, the old ones shall be replaced by the same number of identical (electrically conductive/antistatic) new belts.

The fan pressure and intake openings are protected against hard object entry by means of a net with 8 x 8 mm openings.

If removing the fan with its drive from the housing, disconnect the grounding connection; reconnect it after the reinsertion of the fan into the housing, before restarting the unit.

Droplet eliminator

Droplet eliminator fins are made of electroconductive material with surface resistance lower than 109 Ω. On the upper side, the fins are connected to a steel grounding profile, which is connected to the eliminator frame. The eliminator is connected to the housing frame by means of a grounding connection.

Bottom drain and connection to drain trap

The pan bottom drain is made of a PVC pipe elbow connected to a straight stainless steel pipe with 40 mm external diameter. The pipe is grounded to the air handling unit housing frame.

Control dampers

Control dampers consist of a metal frame, metal blades and metal bearing shells. They are driven by means of a lever mechanism. The blades are interconnected and connected to the frame by means of grounding connections.

Air filters

With explosion-proof air handling unit types, all filters are made of electroconductive material with surface electrical resistance lower then 109 Ω. Every filter is connected to the frame by a grounding connection.

Dirty filters shall only be replaced with those new filters with surface electrical resistance lower than 109 Ω. Every filter shall then be grounded, i.e. connected to the frame by means of the existing grounding connection, or if necessary, a new grounding connection with identical cross section.

Water, steam heater

With category 2 air handling units, the maximum steam temperature shall not exceed 80 % of minimum gas combustion temperature measured in °C, while with category 3 units, the limit is gas combustion temperature. See the SIST EN 1127-1 standard requirements.

It is absolutely necessary that due consideration be given to temperature classification specifications, i.e. minimum gas combustion temperature.

Steam humidifier

With category 2 air handling units, the maximum steam temperature shall not exceed 80 % of minimum gas combustion temperature measured in °C, while with category 3 units, the limit is gas combustion temperature. See the SIST EN 1127-1 standard requirements.

It is absolutely necessary that due consideration be given to temperature classification specifications.

Spray humidifier

The spray system, overflow and fresh water intake pipes are made of steel. The regulator and eliminator fins are made of electroconductive material with surface resistance lower than 109 Ω.

The eliminator is connected to the housing frame by means of a grounding connection.

Internal lighting

All the internal lights are explosion safe.

The light electrical wiring shall be executed only by a competent and authorized person in accordance with the corresponding circuit diagram. The same applies for all maintenance operations.

In case of light bulb replacement, the replacement bulb shall be of equal power; consider the manufacturer's instructions on the relation between light bulb power and temperature class.

Compact subset grounding

All compact subsets shall be interconnected at the installation site by means of grounding connections, and the assembled air handling unit shall be grounded in accordance with the corresponding circuit diagram.

Heating and cooling circuits

The heating and/or cooling circuit elements (pumps, valves with drives, compressors, etc.) shall not be installed into the air handling unit, wired and started, unless they are explosion proof.

System control and electrical installation elements

All control system elements (sensors, drives, etc.) installed within the explosion proof air handling unit housing must comply with the requirements for safe operation in the explosive atmosphere zone for which the unit is designed.

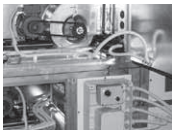
If the air handling unit is installed in an certain explosive zone room, the explosion safety requirements must also be fulfilled by all control elements and equipment installed or mounted on the outer side of the unit housing.

03

Automation

Remote control

Electronic control cabinet



Wiring

Functional start-up

Control system

Since 1994 our air handling units have been fitting with the necessary control equipment. Thus, we offer the complete air handling unit function.

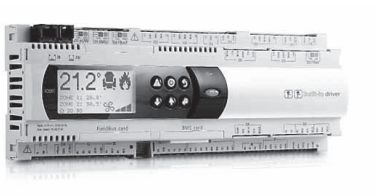
Overview

Control system

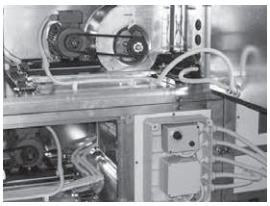
Since 1994 our air handling units have been fitting with the necessary control equipment. Thus, we offer the complete air handling unit function.

Apart from designing and supplying control equipment, control system programme includes the following:

- remote control,
- designing and constructing electric control cabinets,
- designing building management system (BMS),
- electric cable installation, connecting the external control equipment, air handling unit (or other devices) and the electric control cabinets,
- final functional start-up of the entire system, complete with all the measurements.



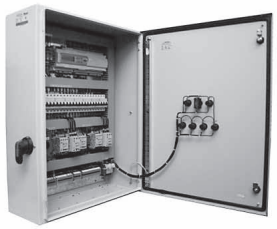
Automation



Wiring

Remote control

Functional start-up



Electronic control cabinet

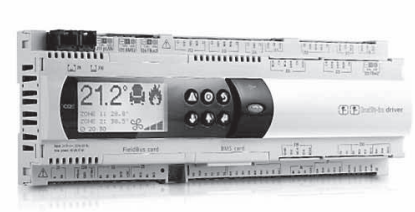
Content

Control system

Automation

To ensure the optimum operation of HVAC systems, we use control equipment by two world renowned manufacturers, Carel and Siemens, with which we integrate our own software. This provides the greatest possible flexibility and is thus a solution for even the most complex and comprehensive HVAC systems for ensuring comfort or meeting precise criteria. This adjustability and rich experience in Slovenia and abroad make it possible for us to issue unique functional warranties that guarantee that the buyer will meet their project parameters.

As peripheral equipment, we also install elements by top manufacturers, e.g. Belimo, Danfoss, Alfaco, Carel, IndustrieTechnic etc.



Control equipment by renowned manufacturers with our own software integrated

Remote operation

The simple and user-friendly operation of air handling units and comprehensive HVAC systems is provided by functionally faultless remote control units that make it possible to operate from one (PGD 1) to 32 (PGD3 – colour touchscreen) HVAC systems with just one operation unit.

Touch screen

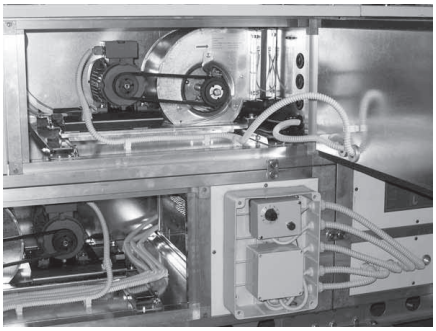
Electric control cabinets

Our own design and manufacture of electric control cabinets provide complete adaptability to the client's or project's requirements. We manufacture internal or external versions of cabinets with an appropriate degree of protection from environmental impact and also explosion-safe versions. The cabinets contain all the power, control, regulating and signalization elements. During production, each electric control cabinet goes through a power and functional test.

Electric control cabinet

Wiring in a facility or in production

The wiring between the peripheral equipment that is integrated into the air handling unit, canal distributions and pipe installations and the electric control cabinets with integrated controller is implemented in accordance with the prepared electric design. At the request of the client, the assembly of peripheral elements and wiring in production is also possible. The wiring between the individual modules of an air handling unit and an electric control cabinet is implemented using special connector joints with the IP 67 degree of protection. Every air handling unit is physically constructed, wired and functionally initiated during the production process, therefore wiring in the facility is not necessary, which enables additional time savings during the realization of the project.



Wiring in production

Control track

As part of the supply of functionally comprehensive air handling units, it is also possible to manufacture an entire control track in the air handling unit encompassing the installation of control valves, circulation pumps, stop valves and restriction valves, manometers, cleaning parts and the implementation of a suitably sealed transition from the air handling unit. Thus, the client only needs to provide an external connection to a hot or cold water supply.

Control track

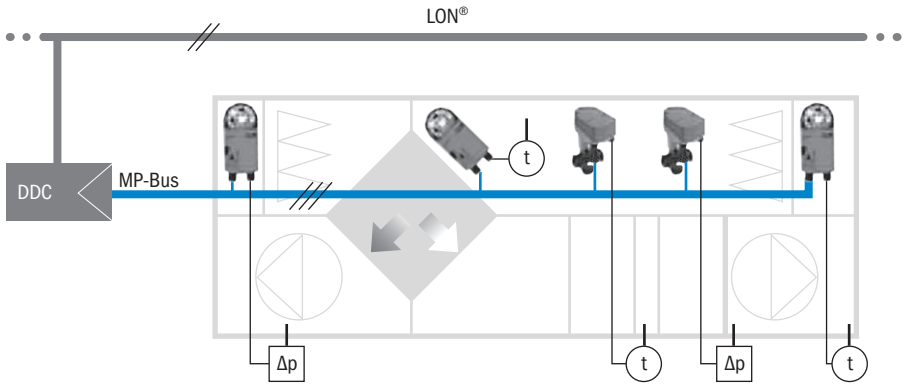
Functional start-up

The last phase of the realization of the project is a functional start-up, which encompasses the setting of all project parameters, measurements of the intake and exhaust volume air flow rate and electric current consumption measurements. Upon completing the start-up, we give the buyer the entire documentation describing the system's operation and all warranty statements.

Functional start-up

MP bus communication

The use of MP-Bus communication drives of blinds, valves and electronic flow controllers provides an additional reduction of the costs of wiring and more detailed monitoring of the device's operation.



MP Bus communication

The continuous management of cooling power

The optimal achievement of a comfortable temperature in systems with direct expansion is provided by electronically controlled valves or with the continuous management of the compressor's frequency controller, which indirectly reduces the cost of energy. Even greater savings are provided with the integration and continuous management of digital screw compressors that are used to change the cooling power (and thus the electricity) from 20 % to 100 %. The management of cooling power via the digital compressor, which enables the variation of cooling power from 10 % to 100 %, is a novelty.

Compressor

Building management system (BMS)

If the facility has many different installations in various remote locations, the CCS provides the user or the maintenance personnel with complete and transparent control over the operation of these systems, which allows rapid intervention in the event of failures. Based on data obtained with the control system, a detailed analysis can be made from the viewpoint of energy conservation, which is the basis for taking measures for optimizing the operation of the individual subsystems.

The software provides:

- a user friendly graphical overview of the system as a whole,
- the management of a database of events, alarms,
- overview of alarms,
- overview of trends,
- overview of events,
- the management of alarms and events,
- calendar and scheduled operation,
- reports editor,
- right of access system,
- communication over a modem or the internet.

The software provides the integration of all communications protocols used in the area of air conditioning, namely:

- Modbus,
- BacNet,
- Lon Works,
- Konex (KNX),
- an option of integrating over OPC.

Alarming with GSM is an additional option.

SCADA by the manufacturers Citect and Carel is used for software.

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