BSK

BSK HAVALANDIRMA A.Ş.
BSK VENTILATION INC.

JUPITER CATALOG

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JUPITER

Air Handling Units

BSK

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İÇİNDEKİLER

1. COMPANY PRESENTATION

Since 2007 we are continuing to serve under the name of BSK Ventilation Equipment Co. (BSK Havalandırma Ekipmanları A.Ş.) in our factory in Sultanbeyli. The first production has been started with culvert, diffuser, louvre, muffler, control and intervention cap, damper, hepa filter box and plenum box varieties and with our manufacturing department of ventilation-air handling units we established in 2012, new products are added every year. Our R & D and product development (p & d) department, which was established in 2011, is responsible for our production. Following the technology and innovations with the ventilation equipment laboratory we have established, BSK continues to work with customer satisfaction.

OUR VISION

As an organization that provides engineering services to the heating, cooling, ventilation sector; our vision is to dominate the foreign and domestic market with dynamic, open to developments, quality and reliable products.

OUR MISSION

In order to maintain the company's work and to protect its existence, it is to create a society of employees who are conscious of their authority and responsibility in their work, who continuously develop in parallel with the company's development and reflect this as a production principle and act as a principle for common purposes.

OUR QUALITY POLICY

- Identify exactly customer requests.
- Ensuring customer satisfaction by working in accordance with quality, price and term.
- To work in production and in service according to the Quality Management System.
- To ensure continuous improvement as a result of training.
- Prevent occupational accidents by following worker health and safety rules.
- Keep operating performance at maximum level.
- Delivering high quality products to our customers, using all our resources efficiently.
- To carry out continual improvement studies to achieve Company Quality goals.
- To produce according to TS EN ISO 9001:2015 which is International Quality Management System Standard.

2. PRODUCT INTRODUCTION

2.1. BENEFITS WE PROVIDE TO OUR STAKEHOLDERS

INVESTORS

CHARACTERISTICS	BENEFITS
Steel Carcass Structure;	Long service life, suitable for difficult working conditions
High Values according to EN 1886;	Energy Efficiency and High Performance
Heat Recovery Applications;	Low Power Consumption and Energy Efficiency
High Corrosion Resistance	Low Maintenance Expenses, Long Life
ISO 9001	Sustainable Quality

OPERATORS

CHARACTERISTICS	BENEFITS
Modular Structure	Low Maintenance Needs
Wide Service Network	Easy Accessibility, Uninterrupted Operation
High Values according to EN 1886;	Energy Efficiency and High Performance
Automation System	Easy operating
Right Component	Minimum Failure

DESIGN COMPANIES

CHARACTERISTICS	BENEFITS
Modular Structure	Wide Model Range
Selection Program	Easy Design and Pricing
Modular Drawings	Easy Product Drawing
Automation System	Compatibility with Building Control Systems
Engineering Infrastructure	Complete Technical Support

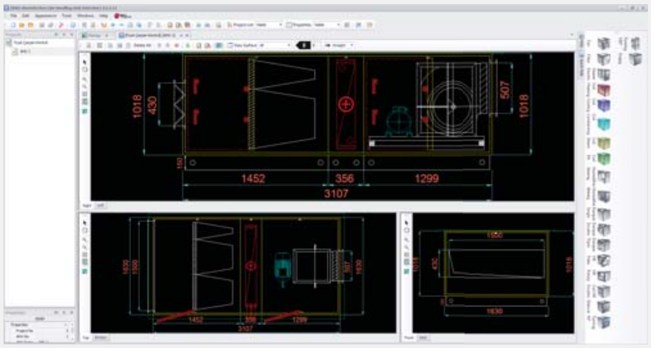
FIELD INSTALLATION TEAMS

CHARACTERISTICS	BENEFITS
Modular Structure	Easy assembling
Selection Program	Technical Drawing
Modular Drawings	Installation Drawings and Instructions
Automation System	Package Automation Solutions
Engineering Infrastructure	Complete Area Technical Support

2.2. OUR INNOVATIONS AND SELF-GIVENESS

2.2.1. BSK AIR HANDLING UNIT SELECTION SOFTWARE

JUPITER AIR HANDLING UNIT selection software is a selection software that meets the needs of users and designers in the best possible way, with web-based features and Eurovent requirements that can meet all manufacturing details of the product during the selection.



Characteristics of JUPITER AIR HANDLING UNIT selection software;

- It allows the selection and design of the most suitable air handling unit for the desired air flow.
- Actual drawings of all designed air handling unit can be created in DxF format.
- Technical documents of all designed air handling unit can be created in the desired format and language.
- By using the latest up-to-date DLLs of the manufacturers, it is possible to select Fan, COIL, Rotor Type Heat Recovery, Plate Type Heat Recovery and Run Around Type Heat Recovery units used in the air handling unit.
- The current price quotation of all designed air handling units can be created.
- The choices and designs of all Fan Section, COIL Section (Fluid Type, Gas Type (DX)), Heat Recovery Section (Rotor, Plated, Run Around), Electric Heater Section, Filter Section (Panel, Bag, Carbon, Hepa etc.), humidification Section (Pad, High Pressure, Steam), Silencer Section, Mixture Section can be made.

2.2.2. QUALITY CERTIFICATES

EUROVENT CERTIFICATE

It is a certificate issued to the product by EUROVENT which tests, certifies and inspects the technical specifications and design criteria of the products manufactured under the title of air conditioning in accordance with European Norms.

ISO 9001 CERTIFICATE

Finished product quality is directly related to the fact that all processes affecting production are designable, measurable, curable and traceable. Based on this understanding, BSK received ISO 9001 certificate in 2007. ISO 9001 is a world-class management system that ensures the development of quality structure, increased operating efficiency and consequently profitability, keeping costs under control, and increasing and sustaining the satisfaction of all stakeholders.

CE MARKING

The CE marking is a key indicator (but not proof) of a product's compliance with European Union (EU) health, safety and environmental protection directives and regulations.

TSE CERTIFICATE

It is an indication that it is suitable according to the Turkish Standards both in terms of technical features and production methods. JUPITER air handling unit is entitled to receive this certificate due to its features.

GOST CERTIFICATE

The GOST certificate indicates that the quality of the product conforms to the regulations of the countries subject to the European customs agreement. Thanks to this certificate, products are available in Russia, Belarus, Kazakhstan, Armenia and Kyrgyzstan. JUPITER air handling unit has been found suitable to receive this certificate with both its technical characteristics and production quality.

2.3. DESIGN FEATURES

JUPITER air handling unit is a high-tech air handling unit designed with high energy efficiency, long life span, operating expenses minimized, easy to produce and full automation features.

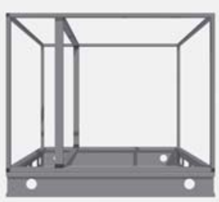
System is superior with the design of the carcass structure, the use of supporting components in accordance with the current European norms, its own air handling unit Selection Program and it has high-level technical values according to EN 1886.
Air cross-sections are designed with reference to standard filter measures. In this case, there is no point where the air does not contact in the air passage cross section and low energy consumption values can be achieved by minimizing the pressure losses inside the device. Having a modular structure provides user convenience during both assembly and disassembly work.

2.3.1. PROFILE AND SKELETON STRUCTURE

JUPITER air handling unit Profile structure is a high strength air handling unit designed on steel profile structure. The general frame structure is made of 25 x 25 x 2 mm, 25 x 50 x 2 mm dip galvanized steel profile. There are joining pieces made of plastic material used in profile corner and intermediate record section. As a standard, all galvanized parts of profile are manufactured as electrostatic oven painted over them. High corrosion resistance can be achieved in this view.

JUPITER AIR HANDLING UNIT CARCASS TECHNICAL SPECIFICATIONS

Carcass Type	25x25x2 mm steel carcass
Carcass Measurements	25x25x2 mm carcass, 25x50x2 mm ground, 25x50x2 mm intermediate
Corner piece	25x25 Nylon Carcass, 25x50 Nylon Carcass
Intermediate record section	25x50 Nylon



25x25 Carcass Corner piece

25x50 Carcass Corner piece

25x50 intermediate Connection piece

25x25 – 25x50 Profile

2.3.2. PANEL STRUCTURE

It is one of the most important parts that will cover the skeleton structure of the air handling unit and affect the performance of the air handling unit in desired performance and time. A proper panel design plays an important role in ensuring that the following items are achieved;

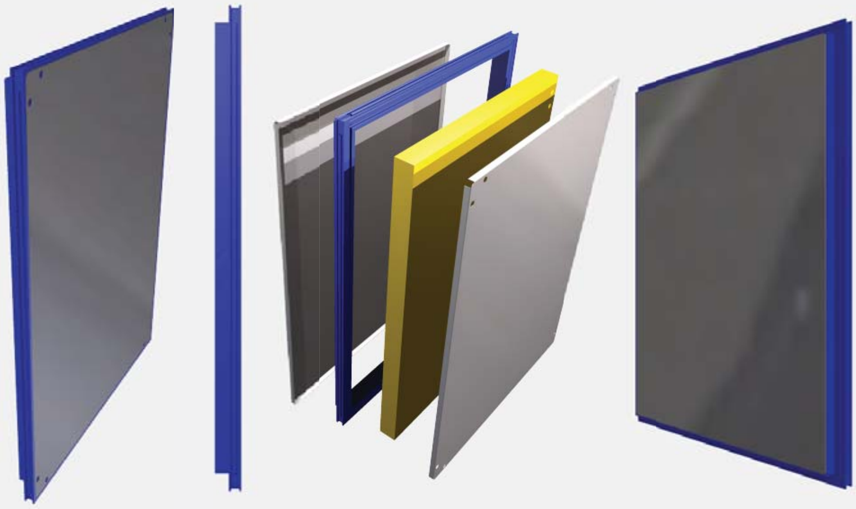
- Low air leakage
- Low temperature leakage
- High lifetime
- Aesthetic look
- Low operating costs

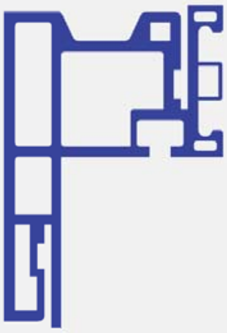
JUPITER air handling unit Panel is designed with metal, rock wool and pvc materials with different heat transfer coefficients minimizing any heat transfer between the interior and the exterior of the air handling unit, which has a temperature difference between them.

The 50 mm thick, 70 kg / m³ density rock wool used as a standard provides thermal insulation between the indoor and outdoor environment. Panel Profiles made of PVC material used between the inner and outer sheets of the panel minimize the heat bridges and provide important contributions to the thermal insulation.

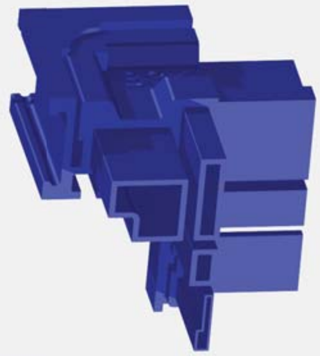
JUPITER AIR HANDLING UNIT PANEL TECHNICAL SPECIFICATIONS

Panel Type	PVC Heat Bridge Reduced Sandwich Panel
Panel Thickness of Inside Sheet	In the range of 0,9 - 0,9 mm, galvanized or stainless
Panel Thickness of Outside Sheet	In the range of 0,9 - 0,9 mm, Painted or Stainless
Insulation Type	50 mm thick, 70 kg / m³ Density Rock Wool





Profile



Panel Corner piece

2.3.3. FOUNDATION STRUCTURE

JUPITER air handling unit is made of 3 mm galvanized sheet as a standard and has a continuous foot structure which allows the total weight of the air handling unit to be transferred homogeneously to the floor. The advantages of this foot structure are;

- Allows the air handling unit to be moved in the worksite environment without being damaged during horizontal and vertical movements.
- It allows easy transportation with its transport and eyelet holes.
- It has high endurance by being manufactured from 3 mm galvanized sheet.
- Due to its rigid structure, the durative foot design will prevent any damage to the air handling unit carcass structure in the horizontal and vertical cargoes to be made in the construction site environment.

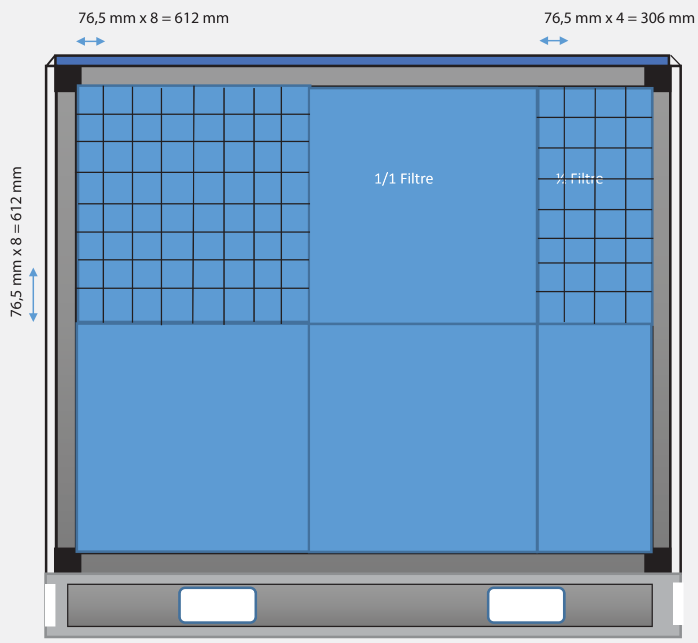
JUPITER AIR HANDLING UNIT FOOT STRUCTURE TECHNICAL SPECIFICATIONS

Foot Type	Continuous Load Distributed Foot Structure
Material	3 mm 275 gr / m² Galvanized Sheet
Transport Type	Suitable for Forklift, Crane, Slingshot
Height	150 mm Standard, 200 - 300 mm Optional

2.3.4. SEALING SYSTEM

The EPDM gasket is used in the JUPITER AIR HANDLING UNIT at each joint point to vary in size and features. In this way both thermal insulation and air leaks are minimized.

2.3.5. MODULAR STRUCTURE



JUPITER AIR HANDLING UNIT air passage cross sections are designed according to EN775 standard filter measurements for the following benefits.

- It conforms to all filter cross section measurements used in the standard.
- Filter surfaces can be fully used as they are the same as air passages.
- As there is no dead space around the filter frames, the surface area of the COIL, heat recovery and similar equipment can be used to the maximum.
- Filter surface areas can be used fully, so that it can be filtered correctly. In this way both the air quality is increased and the equipment which performs the heat transfer is kept clean and the heat transfer can be achieved at maximum efficiency.

- The module size is 76.5 mm which is 1/8 of the full filter size. By means of this module structure, it is possible to produce air handling units with different measurements by adhering to the standard.

2.3.6. CASE CHARACTERISTICS ACCORDING TO EN 1886

In the process of Eurovent certification, A / C plants are tested on the basis of the conditions specified in EN 1886 under the headings Mechanical Strength, Body Air Hatch, Filter Bypass Hatch, Thermal Permeability, Thermal Bridging, Sound Isolation. These tests are carried out on the Model Box, which has all the specifications of the air handling unit body, as specified by the standard. As a result of these tests the technical characteristics of the air handling unit body are determined.

MECHANICAL ENDURANCE

The deflection amount of the AHU body structure is measured under ± 1000 Pa pressure and ± 2500 Pa pressure is measured to determine whether permanent deformation occurs in the AHU body structure.

Body Strength Class	Maximum displacement (mm/m)
D1	4
D2	10
D3	10<

BODY AIR LEAK

Air leaks from the air handling unit are determined by testing under -400 Pa and +700 Pa.

Body Air Leakage Class	Maximum Leak Rate $f_{-400}(lxs^{-1}xm^{-2})$	Maximum Leak Rate $f_{700}(lxs^{-1}xm^{-2})$
L1	0,15	0,22
L2	0,44	0,63
L3	1,32	1,9

FILTER BY-PASS LEAK CLASS

It is the test where the amount of air passing through the filter frame without filtration is determined and classified.

Filter Class	G1-M5	M6	F7	F8	F9
Maximum Filter Leakage Rate %k	6	4	2	1	0,5

THERMAL CONDUCTIVITY CLASS

It is the test where the thermal leaks from the air handling plant's body are determined and measured.

Thermal Conductivity Class	T1	T2	T3	T4	T5
U ($W x m^2 x K^{-1}$)	0,5	1	1,4	2	>2

HEAT BRIDGE CLASS

It is the test where the heat bridges that can form in the body of the air handling unit are identified and measured.

Heat Bridge Class	TB1	TB2	TB3	TB4	TB5
k_b	1	0,75	0,6	0,45	0,3

Test Results According to EN 1886 for JUPITER AIR HANDLING UNIT	
Body Strength Class	D2
Body Air Leakage Class (f_{-400} / f_{700})	L1 / L1
Filter By-Pass Leakage Class	F9
Thermal conductivity class	T2
Heat Bridging Class	TB2

2.3.7. HYGIENE CHARACTERISTICS OF JUPITER AIR HANDLING UNIT

The JUPITER Air Handling Unit meets hygiene requirements with the values of L1, TB2, T2, F9, D2 which are the result of the tests made according to EN 1886 standard.

HYGIENE TECHNICAL CHARACTERISTICS OF JUPITER AIR HANDLING UNIT	
Inner surface	The inner surface is completely smooth. Corner points are rounded to prevent dirt, providing hygiene conditions. In comfort applications, antibacterial silicone application is made at corner points.
Used Sheet Properties	304 stainless steel is used as standard. All the materials used in interior equipment are in this capacity. Fan base systems are painted on galvanized.
Used Plastic Materials	All plastic materials used are antibacterial and have all relevant documentation.
Heat Exchanger Features	All heat exchangers used are applied with stainless frame, epoxy coated lamellae surface. In this way, the corrosion resistance is increased.
Drainage System	Made of 304 quality stainless steel sheet. Thanks to its inclined structure and airflow-compatible mounting, it has passed hygiene tests successfully. It minimizes water retention and improves hygiene conditions without any problems. Isolation is provided by using the cover sheet as a standard under the pan.
Door Handles	Outside mounted door handle is used. There is no mechanism inside the air handling unit. In this case, air leaks, thermal leaks and rough surfaces are prevented.
Fan Type	Plug fan is used as standard with the reason of cleanliness and operational simplicity. There is also the use of backward inclined rare-wing fans according to the customer's wishes.
Filter Frame	Filter frame made of standard 304 quality stainless steel sheet and compression mechanism with F9 class according to EN 1886 tests is used. EPDM casting gasket is used as standard in filter frames.
Lighting and Surveillance Glass	All lighting equipments used are hidden type lighting which provides a smooth surface in the device. The sight glasses used as accessory are also not capable of forming a rough surface inside the device.
Damper	Certified class 4 dampers suitable for hygiene requirements are applied as standard.
EN 1886	The JUPITER air handling unit has fulfilled the Hygiene Conditions by taking the results of Air Duct Class L1 (Top Class), Heat Bridging Class TB2, Thermal Performance Class T2, Filter Leak Class F9 (Top Class), and Mechanical Resistance Class D2 according to EN 1886 tests.

2.4. SECTION CHARACTERISTICS

2.4.1. FAN SECTION

Fans in air handling units; are designed to circulate the air within the system at the desired amount of design values. Within the standards, there are two main groups: axial fans and centrifugal fans according to the fans.

Axial fans operate at high flow rate and low pressure range. Centrifugal fans can work in high pressure range with high flow rate although they vary according to types. For this reason, centrifugal fans are preferred in air handling unit applications.
In the air handling units, 2 main informations are needed for fan selection. These are volumetric airflow and total static pressure.

Depending on the design values, Volumetric Air Flow is calculated according to the volume of the working space, the purpose of use and the type of air handling unit to be operated.
Total Static Pressure is divided into two parts as internal pressure and external pressure. The pressure loss inside the unit is the pressure losses caused by equipment such as COIL, filter, heat recovery exchanger in the air handling unit. External pressure loss is the pressure loss that will occur on the way the air will travel from the outlet of the air handling unit to the working environment. Another important point is the temperature of the air. The temperature change will affect the volumetric flow of air and the pressure losses will also change indirectly.

Fan Laws;

Law No	Dependent Variables				Independent Variables
1a	Q_1	=	Q_2	x	$(D_1/D_2)^3\ (N_1/N_2)$
1b	P_1	=	P_2	x	$(D_1/D_2)^2\ (N_1/N_2)^2\ \rho_1/\rho_2$
1c	W_1	=	W_2	x	$(D_1/D_2)^5\ (N_1/N_2)^3\ \rho_1/\rho_2$
2a	Q_1	=	Q_2	x	$(D_1/D_2)^2\ (P_1/P_2)^{1/2}\ (\rho_2/\rho_1)^{1/2}$
2b	N_1	=	N_2	x	$(D_2/D_1)\ (P_1/P_2)^{1/2}\ (\rho_2/\rho_1)^{1/2}$
2c	W_1	=	W_2	x	$(D_1/D_2)^2\ (P_1/P_2)^{3/2}\ (\rho_2/\rho_1)^{1/2}$
3a	N_1	=	N_2	x	$(D_1/D_2)^3\ (Q_1/Q_2)$
3b	P_1	=	P_2	x	$(D_2/D_1)^4\ (Q_1/Q_2)^2\ \rho_1/\rho_2$
3c	W_1	=	W_2	x	$(D_2/D_1)^4\ (Q_1/Q_2)^3\ \rho_1/\rho_2$

D: Fan radius
N: speed
ρ: Air Density
Q: : Volumetric Air Flow
P: Total Pressure
W: Power

Example:
An Air Handling Unit design is made at 5000 m3 / h air flow and 500 Pa total static pressure. In this operating condition, the selected fan requires 2.4 kW of motor power and fan speed of 850 rpm. There was an increase of 150 Pa during counterpressure during operation. In this new case, how much change will there be in the engine power needed?
Law No 2c;

$$W=2{,}4 \times \left(\frac{650}{500}\right)^{3/2}=2{,}85\text{kW}$$

Comparison of Technical Specifications of Fans Used in Air Handling Units

Fan Type	Pressure Range	Flow Rate	Application Type	Efficiency Range	Power Transmission Type
forward inclined multi-blade fans 	Low Pressure	High Flow	General ventilation	Medium Efficiency	Belt Pulley
backward inclined rare-blade fans 	High pressure	High Flow	Comfort Applications	High Efficiency	Belt Pulley
Plug Fan 	High pressure	High Flow	Comfort and Hygiene Applications	High Efficiency	Frequency Inverter
EC Plug Fan 	High pressure	High Flow	Comfort and Hygiene Applications	High Efficiency	Coupled Frequency Inverter

FAN SECTION CHARACTERISTICS OF THE JUPITER AIR HANDLING UNIT;

Steel Carcass Structure

; In the fan Section where the moving parts of the air handling unit are located, the rigidity of the carcass structure is of great importance for smooth operation under the multiaxial loads caused by moving parts. The JUPITER Air Handling Unit works smoothly under these multiaxial variable loads with its steel carcass structure.

Base System

The fan base system is mounted on the motor and the fan and is connected to the fan section. The fan base system consists of three main components: motor base, fan base and fixed base. The Fan Base System in the JUPITER Air Handling Unit is manufactured from 2 and 3 mm galvanized sheets as standard. Vee belt systems are equipped with motor stretch rails as standard to adjust the belt tension.

Vibration Isolating Elements

Isolation of the vibrations generated by the fan and motor during operation to the air handling unit body is very important for proper operation of the AHU. For this reason, wedges made of rubber material are used as standard in the JUPITER Air Handling Units. Depending on demand, springs can also be used. These elements are used where the fan base system connects to the air handling unit body.

A flexible connection element is used between the snail fan nozzle and the Section panel. The flexible connection element is also used at the junctions of the suction nozzle and the section panel in the plug fans. In this case, the transfer of the vibration of the fan base system to the section body is physically prevented.

2.4.1.1. SNAIL FANS

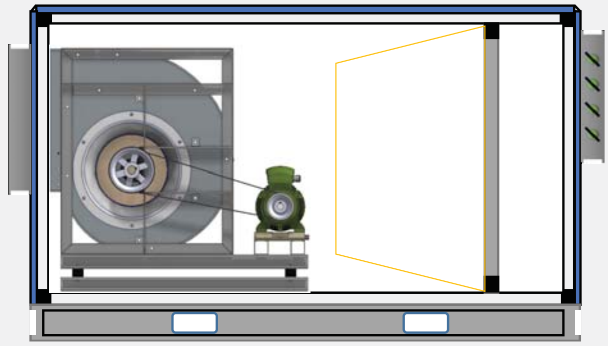
Snail fans have a revolving wheel and a helical structure inside the wheel. Air enters the shaft in parallel from the center and is pressurized to leave the fan tangentially to the tip of the impeller. There are two main types of fans, the forward inclined multi-blade fans and the backward inclined rare-blade fans.

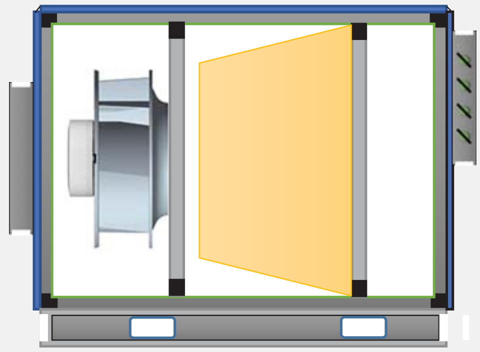
Power transmission from the engine to the fan is done by the belt pulley system in air handling unit applications. The structure consisting of fan, motor, belt-pulley, motor-stretching system and fan-motor is called fan body. When the fan body is connected to the air handling unit, vibration damping elements are used in between.

2.4.1.2. PLUG FANS

The plug fans differ from the snail fans in terms of construction and operating systems with the following features;

- They do not need a belt pulley system for power transmission; the motor shaft is connected directly to the fan shaft. In this case, the losses caused by the belt pulley can be minimized during power transmission.
- Their own section and subsequent Section are positively pressurized.
- Due to its compact construction, it occupies less space and Section are shorter.
- Service needs are less because they have less moving parts than snail fans. This contributes to lower operating costs.
- Thanks to the structure and transmission organs, the fans are more efficient and have less energy consumption.





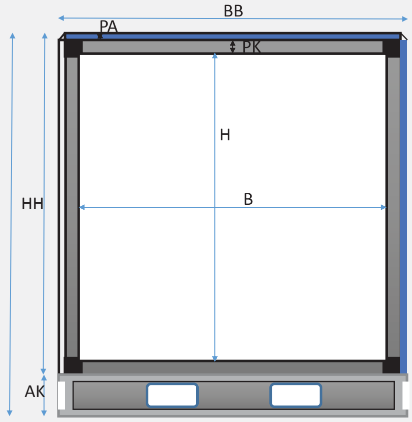
FAN SECTION DIMENSION CALCULATION

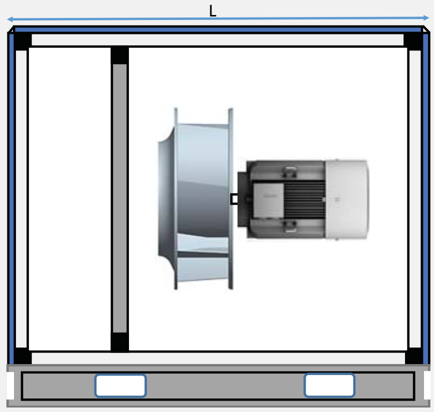
Definitions:

Model Number:	JUPITER H x B (Number of Height Modules x Number of Width Modules)
Module Constant (m):	76,5 mm
Panel height (P):	25 mm
Profile Height (T):	25 mm
Section Height (H):	Number of Height Modules x Module Constant
Section Width (B):	Number of Width Modules x Module Constant
section Height (HH):	Section Height+ 2xProfil Dimension + Panel Height+ Foot Height
section Width (BB):	Kesit Genişliği + 2xProfil Ölçüsü + 2xPanel Yük.
section Length (L):	Number of Length Modules x Module Constant + 2xProfile Dimension + 2xPanel Height

Example Calculation;

JUPITER 8 x 12 (Number of Length Modules 16)
HH: 8x76,5 + 2x25 + 25 + 150 = 837 mm
BB: 12x76,5 + 2x25 + 2x25 = 1018 mm
L: 16x76,5 + 2x25 + 2x25 = 1316 mm





If it is intermediate section, L-size calculation is L: 16x76,5 + 2x25
If it is first or last section, L-size calculation is L: 16x76,5 + 2x25 + 25

2.4.2. COIL SECTION

It is the heat exchangers used to heat, cool and dehumidify the transported air. According to the type of conditioned fluid used, two main groups are separated as aqueous system and refrigerant system (Gas System).

GENERAL CHARACTERISTICS OF COIL

COIL BODY

Explanation
It is the carcass structure that forms the outer part of the COIL.

Features
Galvanized, Painted, Stainless, Magnelis, Aluminum materials with 1.2 - 2.5 mm thickness.

LAMELLAE SURFACE

Explanation
It consists of plates that form the heat transfer surface area of the COIL and are placed in certain spaces called pitch. The line spacing is 2.1 - 2.5 - 2.8 - 3.0 - 3.2 mm in the standard.

Features
It is produced by using Aluminum or Copper. Lamellae surfaces can be coated as Hydrophilic, Epoxy, Heresite, Blygold.

COLLECTOR

Explanation
It connects the pipes that provide the circulation of the refrigerant in the COIL. It is the element that provides the inlet and outlet of the refrigerant.

Features
It is produced as Painted Steel Pipe or Copper.

GEOMETRY

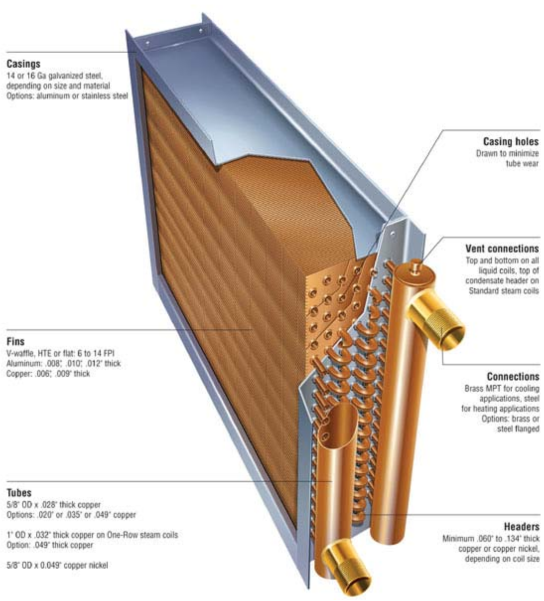
Explanation
It is a structure that defines the layout of the pipes that circulate the refrigerant in the COIL.

Features
Optionally 32x28-1 / 2, 38x33-5 / 8, 25x22-3 / 8 are used.

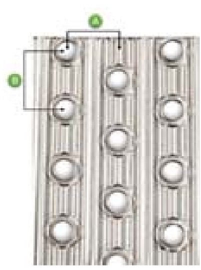
ORDER NUMBER CIRCUIT NUMBER

Explanation
The number of order describes how many pipes are formed in the direction of air flow of the COIL; and the number of circuits defines the number of inputs and outputs for the total number of pipes.

Features
Optionally the number of order is used in the range of 1 - 12.



Geometry	Measure A	Measure B	Pipe Diameter
32x28 - 1/2	27,5 mm	31,75 mm	1/2
38x33 - 5/8	33 mm	38,1 mm	5/8
25x22 – 3/8	21,65 mm	25 mm	3/8



2.4.2.1. WATER SYSTEM COIL

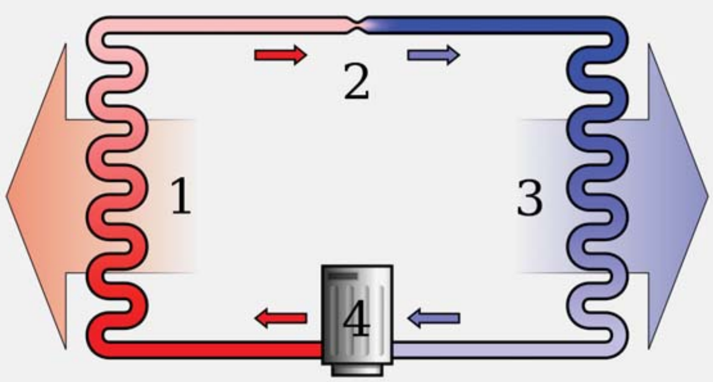
The conditioned water required for heating and cooling processes is supplied from boiler and chiller. The generated conditioned water is circulated in the heating and cooling coils inside the air handling unit with the help of pump and other installation elements. Heat transfer takes place between the air passing through the COIL and the circulating water, thus conditioning the air.

2.4.2.2. GAS SYSTEM COIL

The energy required for heating and cooling occurs during evaporation and condensation of the refrigerant. During the evaporation of the refrigerant, it draws heat from the air passing through it. Thus the temperature of the air is falling and cooling. During the condensation of the refrigerant, heat is released into the air passing over it. So the temperature of the air rises and the air heats up.

The basic elements of gas system air handling units are Evaporator COIL, Condenser COIL, Compressor, Expansion Valve. Depending on the application type, all of these equipments can be in the air handling unit. Another application type is the VRF system + Air Handling Unit application where the condenser and compressor are out of the air handling unit.

Refrigerating Cycle



1. Condenser
2. Expansion Valve
3. Evaporator
4. Compressor

2.4.2.3. JUPITER COIL SECTION CHARACTERISTICS

Modular Structure; ; Thanks to the modular structure of the JUPITER Air Handling Unit, the dimensions of the air passage cross section of the air handling unit and the dimensions of the COIL air passage cross section are dimensioned to be very close to each other. This ensures a homogeneous airflow through the COIL surface, allowing maximum efficiency from the COIL.

The Condensation Pans and Drainage System ; is used as standard in the COIL section. Made of stainless steel sheet. Thanks to its 3 sloping design, the water in the COIL is collected in one spot and can be drained quickly. The lower part of the drain pan is insulated against condensation from external environment with 3 mm rock wool. As a standard ball siphon is applied.

Drop Holder; is a device used to prevent water formed by condensing on the COIL surface from drifting with air and passing through other section. It is made of PP material and its frame is made of stainless steel sheet as a standard.

If the number of orders, the number of circuits, the number of pipelines, the number of pitchs and the length of the lamellae are changed, there will be changes in the surface velocity of the COIL, air side pressure loss, fluid side pressure loss and capacity.

SPECIFICATIONS		SPEED	AIR SIDE PRESSURE LOSS	FLUID SIDE PRESSURE LOSS	CAPACITY
number of orders	IF INCREASE	not CHG	INCREASE	INCREASE	INCREASE
	IF DECREASE	not CHG	DECREASE	DECREASE	DECREASE
number of circuits	IF INCREASE	not CHG	DECREASE	DECREASE	DECREASE
	IF DECREASE	not CHG	INCREASE	INCREASE	INCREASE
PITCH	IF INCREASE	not CHG	DECREASE	DECREASE	DECREASE
	IF DECREASE	not CHG	INCREASE	INCREASE	INCREASE
number of pipelines	IF INCREASE	DECREASE	DECREASE	INCREASE	INCREASE
	IF DECREASE	INCREASE	INCREASE	DECREASE	DECREASE
length of lamellae	IF INCREASE	DECREASE	DECREASE	INCREASE	INCREASE
	IF DECREASE	INCREASE	INCREASE	DECREASE	DECREASE

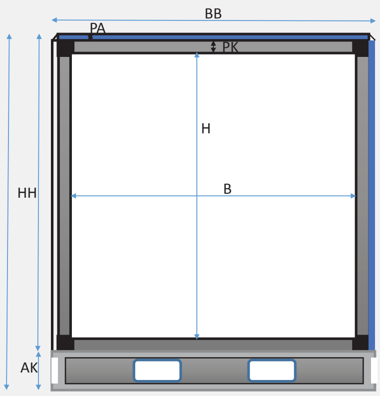
FAN SECTION DIMENSION CALCULATION

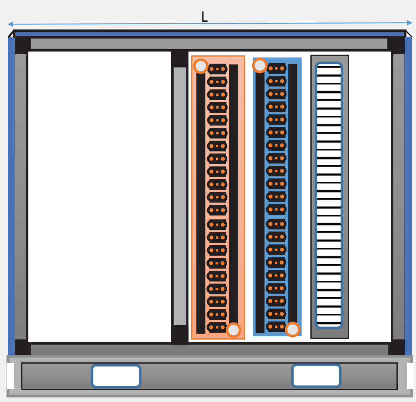
Definitions:

Model Number:	JUPITER H x B (Number of Height Modules x Number of Width Modules)
Module Constant (m):	76,5 mm
Panel height (P):	25 mm
Profile Height (T):	25 mm
Section Height (H):	Number of Height Modules x Module Constant
Section Width (B):	Number of Width Modules x Module Constant
Section Height (HH):	Section Height+ 2xProfil Dimension + Panel Height+ Foot Height
Section Width (BB):	Kesit Genişliği + 2xProfil Ölçüsü + 2xPanel Yük.
Section Length (L):	Number of Length Modules x Module Constant + 2xProfile Dimension + 2xPanel Height

Example Calculation;

JUPITER 8 x 12 (Number of Length Modules 16)
HH: 8x76,5 + 2x25 + 25 + 150 = 837 mm
BB: 12x76,5 + 2x25 + 2x25 = 1018 mm
L: 16x76,5 + 2x25 + 2x25 = 1316 mm





If it is intermediate section, L-size calculation is L: 16x76,5 + 2x25
If it is first or last section, L-size calculation is L: 16x76,5 + 2x25 + 25

2.4.3. FILTER SECTION

2.4.3.1. WHY IS THE FILTRATION IMPORTANT?

Particles can be found in the air up to visible levels from the micron level. These particles can reach both the air handling unit equipment and the living quarters by moving the air by the air handling unit. These particles cause both the air handling unit to work inefficiently and may have negative consequences for human health. Filtering systems are used in the air handling unit to minimize these adverse effects.

The filters used vary according to the working environment. G3 - G4 class panel filter for filtering visible parts and M5 - M6 - F7 - F8 - F9 bag filters for filtering invisible particles.

In addition, metal filters, activated carbon filters and electrostatic filters are used in filtration applications especially for oil and deodorant.

FILTER TYPES

G Class Input Filter

M Class Medium Filter

F Class Fine Filter

Active Carbon Filter

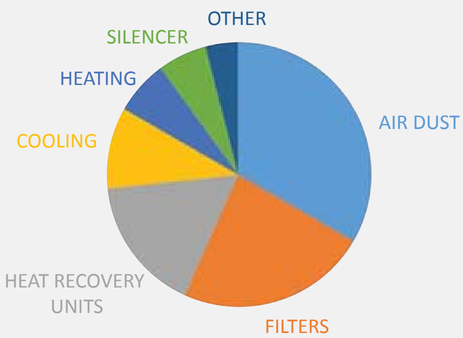
Electro Static Filter

2.4.3.2. FILTER ENERGY CLASSIFICATION

The air filters used in the air handling units directly affect the power consumption of the air handling unit motor due to the pressure loss they create. For this reason, the right filter selection is important for the operating costs of the air handling unit. The main equipment that cause pressure losses in ventilation and air conditioning systems are air ducts, filters, heat recovery units, heating-cooling equipments, silencers. These pressure losses play an important role in determining the total electricity consumption of the air handling unit.

The selection and replacement periods of the filters which are very effective in terms of energy consumption of the air handling unit are very important.

PRESSURE DISTRIBUTION OF EQUIPMENT IN AIR HANDLING UNIT



EN 779:2012

FILTER CLASSIFICATION TABLE			Recommended Pressure Loss Value Begining	Recommended Pressure Loss Value Final
Medium Efficiency	Intake Filter	G2 ≥ %65	60 Pa	250 Pa
		G3 ≥ %80		
		G4 ≥ %90		
High Efficiency	Prefiltering	M5 ≥ %40	100 Pa	450 Pa
		M6 ≥ %60		
	Fine Filtering	F7 ≥ %80	120 Pa	450 Pa
		F8 ≥ %90		
		F9 ≥ %95		

Filter Energy Consumption Calculation:

$$W = \frac{q_v . \Delta p . t}{\eta . 1000}$$

W:Annual energy consumption(kWh)
q_v:Filter airflow amount (m^3/s)
t: Operating time
η: Fan efficiency

Filter Class	M5	M6	F7	F8	F9
ME	-	-	ME ≥ %35	ME ≥ %55	ME ≥ %70
	Mm=250g Ashrae			Mf=100g Ashrae	
A+	0-450 kWh	0-550 kWh	0-800 kWh	0-1000 kWh	0-1250 kWh
A	>450-600 kWh	>550-650 kWh	>800-950 kWh	>1000-1200 kWh	>1250-1450 kWh
B	>600-700 kWh	>650-800 kWh	>950-1200 kWh	>1200-1500 kWh	>1450-1900 kWh
C	>700-950 kWh	>800-1100 kWh	>1200-1700 kWh	>1500-2000 kWh	>1900-2600 kWh
D	>950-1200 kWh	>1100-1400 kWh	>1700-2200 kWh	>2000-3000 kWh	>2600-4000 kWh
E	>1200 kWh	>1400 kWh	>2200 kWh	>3000 kWh	>4000 kWh

2.4.3.3. PREFILTERS

These filters are classified as class G according to EN 779, which is used as the first filter in the air inlet section. It is generally used for filtration of visible particles. Filter material is widely used in polyester fiber. Filter frame is made of galvanized sheet. The air handling unit is shipped from the factory with filter on it in order to prevent the coarse construction particles in the air ducts from reaching the air handling unit during the first commissioning of the air handling unit. The filter frame mechanism is applied as a slide or clip.

2.4.3.4. SEMIFILTERS

It is an invisible bag filter used for the filtration of particles below 10 µm and named as M class according to EN 779. Synthetic fibers are used as filter material. There are alternatives to 300 mm and 600 mm pocket lengths. Filter frame is made of galvanized sheet as standard. It can be manufactured as PVC or stainless steel as an option.

2.4.3.5. FINE FILTERS

They are bag filters which are classified as class F according to EN 779 which are used for filtering invisible particles of 10 - 1 μm. Synthetic fibers are used as filter material. It can be produced as 4 - 8 pockets, with a pocket length of 300 - 600 mm. Filter frame is made of galvanized sheet. It can be manufactured in PVC or stainless steel as an option. In PVC frame production, PVC is formed with rigid structure in bag pockets. Thus, air movement will prevent the pocket from swinging and the particles from falling in to the air handling unit. It is a preferred type of application especially in hygiene applications.

Modular Structure; ; Thanks to the modular structure of the JUPILER Air Handling Unit, the air flow cross section and the filter cross section measurements of the air handling unit are identical. The cross-sectional dimensioning design is based on the filter measurements specified in EN 779. In this way, the filter surface areas are fully utilized and maximum efficiency is obtained from the filters.

Prestressed Filter Frame System; Thanks to the mechanism that works with the spring system and applies the prestresses to the filters, the filter frames achieve F9 sealing class values. Thanks to the high degree of sealing, the air passing through the filter section passes through the filter frame without the by-pass and is provided with complete filtration. In this way both air quality and in-device protection are maximized.

FILTER SECTION DIMENSION CALCULATION

Definitions:

Model Number:	JUPITER H x B (Number of Height Modules x Number of Width Modules)
Module Constant (m):	76,5 mm
Panel height (P):	25 mm
Profile Height (T):	25 mm
Section Height (H):	Number of Height Modules x Module Constant
Section Width (B):	Number of Width Modules x Module Constant
Section Height (HH):	Section Height+ 2xProfil Dimension + Panel Height+ Foot Height
Section Width (BB):	Kesit Genişliği + 2xProfil Ölçüsü + 2xPanel Yük.
Section Length (L):	Number of Length Modules x Module Constant + 2xProfile Dimension + 2xPanel Height

Example Calculation;
JUPITER 8 x 12 (Number of Length Modules 16)
HH: 8x76,5 + 2x25 + 25 + 150 = 837 mm
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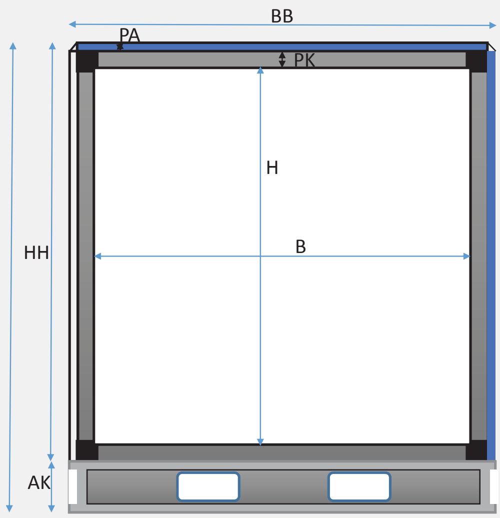
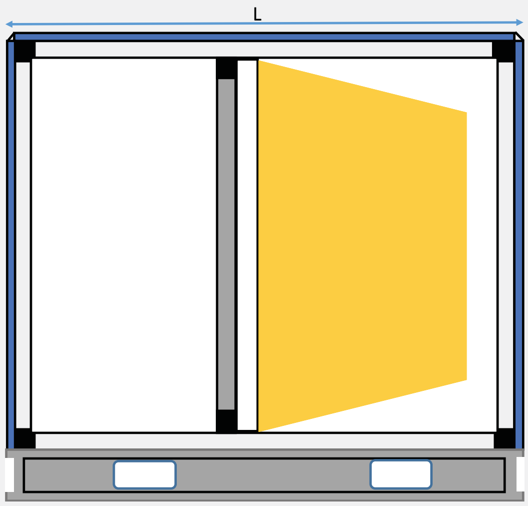




If it is intermediate section, L-size calculation is L: 16x76,5 + 2x25
If it is first or last section, L-size calculation is L: 16x76,5 + 2x25 + 25

2.4.4. HEAT RECOVERY SECTION
2.4.4.1. WHY IS HEAT RECOVERY IMPORTANT?

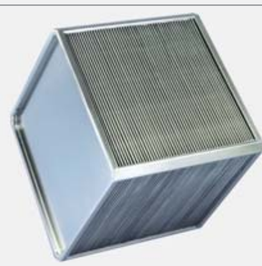
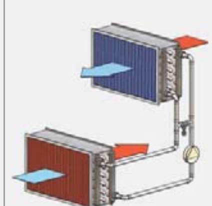
The living quarters need a constant amount of fresh air to ensure the continuity of the desired comfort conditions. The fresh air must be conditioned and the indoor air must be vented. If the necessary measures are not taken, the energy that is possessed will be taken to the external environment. Heat recovery systems are used in air handling units to recover this energy. In this way, the indoor air transfers its energy to the air taken from the outside by means of a heat exchanger.

The following advantages are provided for the proposed air conditioning systems using heat recovery systems;

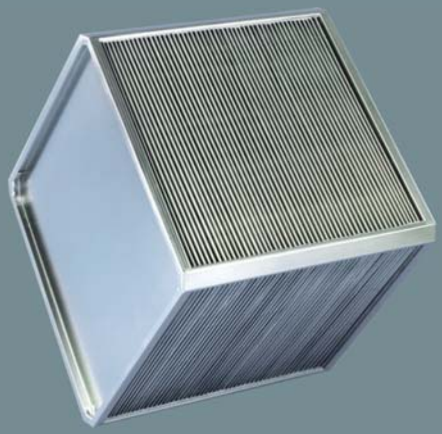
- The required heating and cooling loads will be lower.
- Due to lower heating and cooling loads, smaller pump and plant will be needed.
- Because of the low heating and cooling loads, smaller heat exchangers will be needed in air handling units.
- Operating costs will be lower due to the shrinking of the required capaci-ties.

The use of heat recovery systems of air handling units will be very beneficial becau-se of the 4 important reasons mentioned above.

COMPARISON OF HEAT RECOVERY SYSTEMS

Features	Rotory Heat Recovery	Plate Heat Recovery	Heat Pipe Heat Recovery	Run Around Heat Recovery
According to Air Flow	Counter Flow Paralel Flow	Counter Flow Paralel Flow	Counter Flow Paralel Flow	Counter Flow Paralel Flow
Heat Transfer Procedure	sensible (50 - 80%) Total (55 - 85%)	sensible (50 - 80%) Total (55 - 85%)	sensible (45 - 65%)	sensible (55 - 65%)
Surface Velocity (m/s)	2,5 - 5	0,5 - 5	1,5 - 3	2 - 4
Air Side Pressure Loss (Pa)	60 - 250	5 - 450	100 - 500	100 - 500
Operating Temperature Range (°C)	- 55 / 95	- 60 / 800	- 45 / 500	- 40 / 35
Different Features	Moisture Transfer Compact section Measurements Low Pressure Loss	No moving parts Low Pressure Losses Easy to Clean	No moving parts Fan Position is Not Important	Exhaust Line Can Be Removed. Fan Position Not Important
Limitations	Frequent care is needed in cold climate conditions.	Latent Heat Transfer Available in Special Production	Limited Supplier	Requires an accurate simulation model for high activity.
Air leakage	1 - 10%	0 - 5%	0%	0%
Control	Heat Wheel Speed Control Unit	Bypass Damperi	With Position Slope Angle Change	Bypass Valve or Pump Speed Control
				

2.4.4.2. PLATE HEAT RECOVERY SYSTEMS



By utilizing the temperature difference between the outdoor and the indoor air, the heat is recovered by passing the two air flow through the heat exchanger formed by the plates with high heat conductivity so as not to mix with each other. Plates are usually made from aluminum. It can be used for plastic or cellulosic materials. Airflow efficiency can be 90% contrary to flow or crossflow with a yield of 65%.

2.4.4.3. FREECOOLING APPLIANCE FOR JUPITER AIR HANDLING UNIT

In the transition periods, the desired comfort temperature values and outdoor temperature values are close to each other. In this case, the desired comfort conditions can be achieved by using 100% outdoor air before any heating or cooling system is operated for climate conditioning. This saves energy.

By-pass dampers are used for this process in the plate heat recovery section. With a damper application placed on a plate exchanger, 100% fresh air can be sent without a heat exchange between return air and fresh air. This application is applied as a standard in all air handling units that require Free Cooling.
The by-pass damper application is additionally used in the dissolution of ice formation on plate heat recovery, especially in the winter months.

2.4.4.4. CHARACTERISTICS OF HEAT RECOVERY SECTION OF JUPITER AIR HANDLING UNIT

Modular Structure; Plate heat recovery section designed with the modular structure of the Jupiter Air Handling Unit heat exchanger allows the air flow cross-section to be designed closest to the central air flow cross-section. In this case, the pressure loss on the inside of the section is minimized and the air can pass homogeneously through the exchanger. In this way, heat recovery efficiency can be maximized.

Application of condensation pan; Depending on the season, the plated heat recovery section can cause condensation both on the exhaust side and on the fresh air side. It is necessary that the water that is formed here does not damage the interior of the air handling unit and must be drained in the environment without deteriorating the comfort features of the area. For this reason, these section are used as condensation pan application as standard.

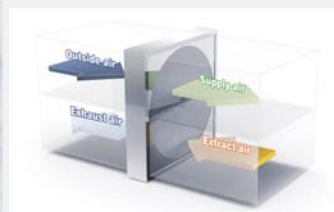
Filter Application; It is very important to keep the exchanger surfaces clean in order to obtain maximum efficiency in the plate heat recovery units. The accumulation of dust on the heat exchanger surface will adversely affect heat transfer. To prevent this, prefiltering is done as a standard on both the fresh air side and the exhaust side.

2.4.4.5. ROTARY HEAT RECOVERY SYSTEMS

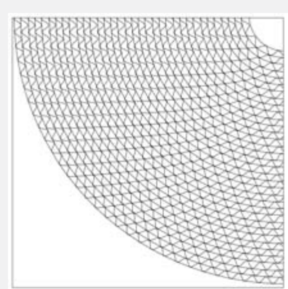
Rotary heat recovery systems provide heat transfer between the return air and the fresh air with fillings made of aluminum material. The rotary type heat recovery systems with circular cross section are divided into 2 equal parts with 180 degrees of exhaust air and 180 degrees of fresh air passing. Depending on the type of rotor they perform heat transfer at a speed of 10 - 20 rpm.

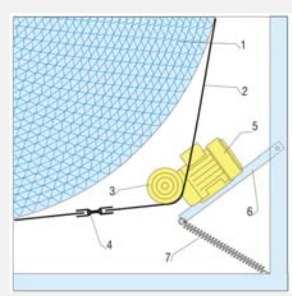
Depending on the nature of the filling material used, they can perform both latent and sensible heat transfer. They can reach yield values in the range of 70 - 85%. They require less space than platemaking heat recovery systems due to their construction. These systems are often preferred in air handling units for both efficiency and dimensional advantages. Rotor rotation is provided by the motor and belt pulley mechanism used. Optionally, the rotation speed of the rotor can be set as fixed or variable speed.

Due to porous structures in rotary heat recovery systems, there is a possibility that a certain amount of exhaust air is mixed into fresh air. To prevent this, a sweep zone application is being implemented. The sweeping zone cleans the exhaust air between the pores using a certain amount of fresh air. In order to achieve this, the pressure value of the fresh air must be higher than the exhaust.

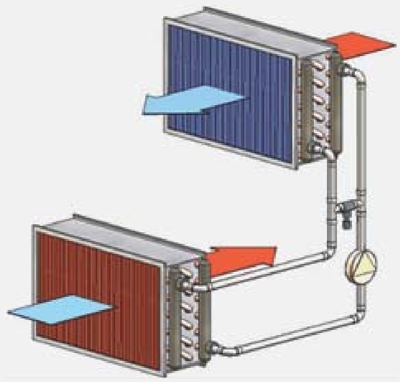


1.Rotor Wheel,
2.V Belt,
3.Pulley,
4.Belt Connection Equipment,
5.Motor,
6.Motor Table,
7.Tension Spring





2.4.4.6. RUN AROUND HEAT RECOVERY SYSTEMS

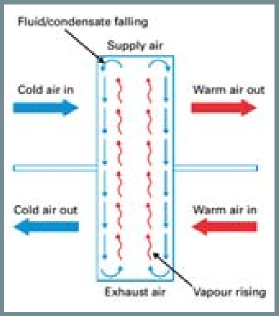


The heat recovery system is realized by passing the fresh air and exhaust air with temperature difference between them through the water type heat exchangers and transferring the energy to the circulating water in the heat exchanger with the help of the pump and transferring it from the water back to the air. In applications where the temperature difference between the exhaust air and the fresh air is high, the efficiency can be reached between 45 - 55%. It is widely preferred especially if the fresh air line and the exhaust line are located in different regions.

Run around heat recovery system consists of fresh air line heat exchanger, exhaust line heat exchanger, circulation pump, shut-off valves, strainer and other installation elements. Water flows as a fluid in the system. In general, antifreeze is used at certain rates as a precaution against frost. If the system will not work for a long time, it is recommended to drain the water.

2.4.4.7. HEAT PIPE HEAT RECOVERY SYSTEMS

The Heat Pipe Heat Recovery system operates on the principle of the evaporation of the refrigerant by absorbing the heat from the other hotter fluid under a certain pressure, and condensation by transferring heat to the fluid with lower temperature under a certain pressure.Heat pipe heat recovery units do not have compressor and expansion valve used in conventional refrigeration cycle. The system consists of exchangers with special piping arrangement in which the pre-pressurized refrigerant is present..



The warm outdoor air passes through the heat pipe and transfers the heat to the refrigerant, thus its temperature falls. The evaporating refrigerant fluid moves to the top of the exchanger towards the exhaust air. The exhaust air with lower temperature than the refrigerant flow draws heat from the refrigerant, raising the temperature and the refrigerant condensing returns to the fresh air line. At this point, heat pipe heat recovery cycle is completed.

HEAT RECOVERY SECTION DIMENSION CALCULATION

Definitions:

Model Number:	JUPITER H x B (Number of Height Modules x Number of Width Modules)
Module Constant (m):	76,5 mm
Panel height (P):	25 mm
Profile Height (T):	25 mm
Section Height (H):	Number of Height Modules x Module Constant
Section Width (B):	Number of Width Modules x Module Constant
Section Height (HH):	Section Height+ 2xProfil Dimension + Panel Height+ Foot Height
Section Width (BB):	Kesit Genişliği + 2xProfil Ölçüsü + 2xPanel Yük.
Section Length (L):	Number of Length Modules x Module Constant + 2xProfile Dimension + 2xPanel Height

Example Calculation;

JUPITER 8 x 12 (Number of Length Modules 16)
HH: 8x76,5 + 2x25 + 25 + 150 = 837 mm
BB: 12x76,5 + 2x25 + 2x25 = 1018 mm
L: 16x76,5 + 2x25 + 2x25 = 1316 mm

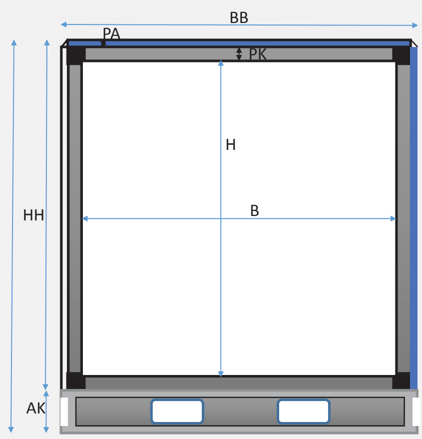
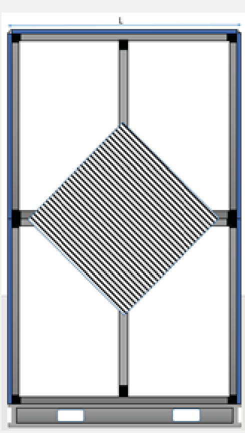
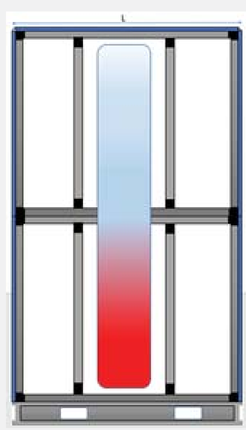


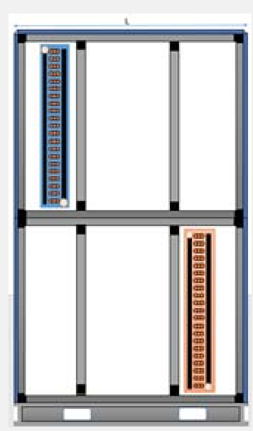
PLATE HEAT RECOVERY



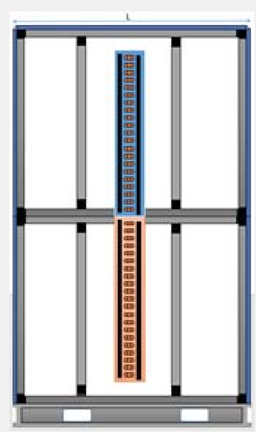
ROTARY HEAT RECOVERY



HEAT PIPE HEAT RECOVERY



RUNAROUND HEAT RECOVERY



If it is intermediate section, L-size calculation is L: 16x76,5 + 2x25
If it is first or last section, L-size calculation is L: 16x76,5 + 2x25 + 25

2.4.5. HUMIDIFICATION SECTION

2.4.5.1. STEAM HUMIDIFICATION

Steam humidification systems in air handling units are provided to obtain steam from water or to transfer the ready steam in the system to the air with the help of spreaders. Steam humidifier with electrode, steam humidifier with steam and steam injection units are used in the method of obtaining steam from water. These units can be installed inside or outside the air handling unit.

The steam humidifier units are integrated with the air handling unit automation system and can provide the required comfort conditions precisely with on / off or proportional control as required. The steam generated in these units reaches the steam radiator with special pipes reinforced with steel wires and it is transported to the air here.

2.4.5.2. SPRAY HUMIDIFICATION SYSTEM

The spray humidification system works by deducing the water to small particles in the sprinkler systems under high pressure to increase the heat transfer surface and to ensure that it is quickly diffused into hot and dry air passing over it.

The system consists of pump, water system, sprinkler system, drop holder, stainless pan and control unit.

2.4.5.3. PAD HUMIDIFICATION SYSTEM

Pad humidification system works based on the principle of evaporative cooling system. The dry and hot air is passed over the wetted surface of the pad sheet to evaporate the water on the pad. At this time the temperature of the air will fall and it will get the evaporating water. The main components of the system are;

- Pads
- Circulation pump
- Water pool
- Sprinkler system
- Installation elements
- Stainless body

HUMIDIZATION SECTION DIMENSION CALCULATION

Definitions:

Model Number:	JUPITER H x B (Number of Height Modules x Number of Width Modules)
Module Constant (m):	76,5 mm
Panel height (P):	25 mm
Profile Height (T):	25 mm
Section Height (H):	Number of Height Modules x Module Constant
Section Width (B):	Number of Width Modules x Module Constant
Section Height (HH):	Section Height+ 2xProfil Dimension + Panel Height+ Foot Height
Section Width (BB):	Kesit Genişliği + 2xProfil Ölçüsü + 2xPanel Yük.
Section Length (L):	Number of Length Modules x Module Constant + 2xProfile Dimension + 2xPanel Height

Example Calculation;

JUPITER 8 x 12 (Number of Length Modules 16)
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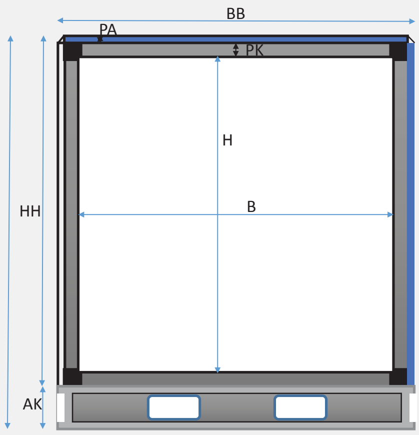
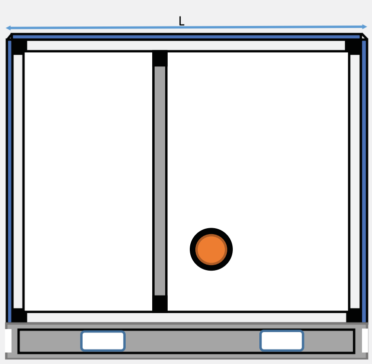
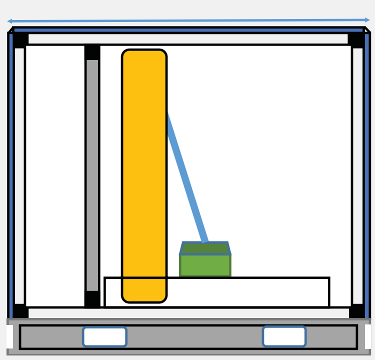


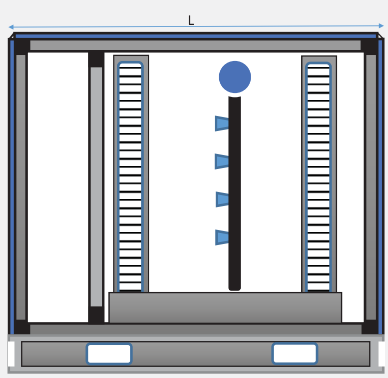
STEAM HUMIDIFICATION

PAD HUMIDIFICATION

SPRAY HUMIDIFICATION







If it is intermediate section, L-size calculation is L: 16x76,5 + 2x25
If it is first or last section, L-size calculation is L: 16x76,5 + 2x25 + 25

2.4.6. MIXING BOX
2.4.6.1. SINGLE FAN MIXING SECTION

In air-conditioning plants that do not operate with 100% fresh air, they are mixed with return and fresh air at certain ratios. With this application, the energy of the conditioned indoor air is utilized again. However, this application should not be considered as heat recovery. In particular, the quality of the return air is important in this application, and should not be used as a mixture air unless it is of sufficient quality.
In the single fan mixed section application, one fan and two dampers one for fresh air and one for return air are used in the system, The sum of fresh and return air forms the total flow.

2.4.6.2. DOUBLE FAN MIXING SECTION

Double Fan Mixing Section is used when you want to exhale the return air through the same air handling unit and you need fresh air at certain rates. This application proportionally adjusts the amount of fresh air and return air. Temperature control can be performed at this point. In these section uses, it is necessary to make sure that the exhaust line pressurizes the section positively. Otherwise the fresh air line will pass by.

2.4.6.3. DAMPERS

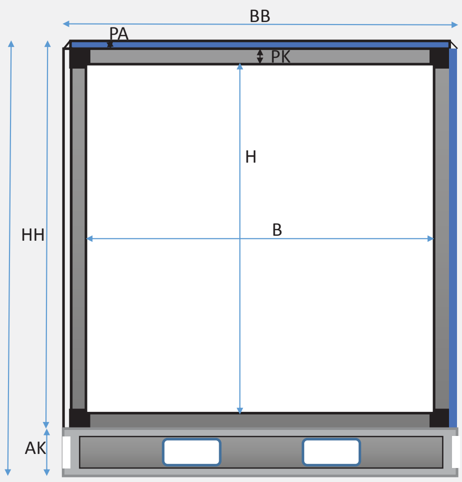
It is used to direct the air in the air handling unit, to set the flow rate, to disconnect the device from the outdoor. Manual, proportional and on / off control is possible.
Body Structure;specially designed with aluminum profiles, aerofil wing structure. The wing movements are driven by the hidden gear system. The hiddenness of the gear system protects moving parts against the effects of outdoor. Thus, this damper can serve without interruption.
Gasket Construction; each wing has a double-sided seal made of plastic material. When the wings are fully closed, air leaks at the wing joints can be minimized.

Definitions:

Model Number:	JUPITER H x B (Number of Height Modules x Number of Width Modules)
Module Constant (m):	76,5 mm
Panel height (P):	25 mm
Profile Height (T):	25 mm
Section Height (H):	Number of Height Modules x Module Constant
Section Width (B):	Number of Width Modules x Module Constant
Section Height (HH):	Section Height+ 2xProfil Dimension + Panel Height+ Foot Height
Section Width (BB):	Kesit Genişliği + 2xProfil Ölçüsü + 2xPanel Yük.
Section Length (L):	Number of Length Modules x Module Constant + 2xProfile Dimension + 2xPanel Height

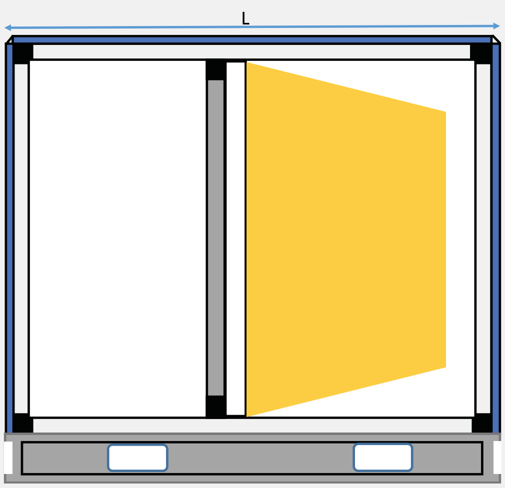
Example Calculation;

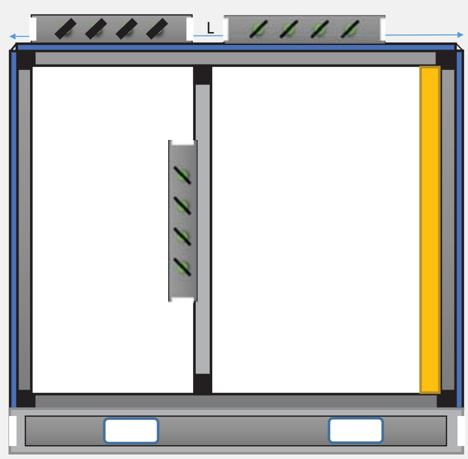
JUPITER 8 x 12 (Number of Length Modules 16)
HH: 8x76,5 + 2x25 + 25 + 150 = 837 mm
BB: 12x76,5 + 2x25 + 2x25 = 1018 mm
L: 16x76,5 + 2x25 + 2x25 = 1316 mm



SINGLE FAN MIXING SECTION

DOUBLE FAN MIXING SECTION





If it is intermediate section, L-size calculation is L: 16x76,5 + 2x25
If it is first or last section, L-size calculation is L: 16x76,5 + 2x25 + 25

2.4.7. ELECTRICAL HEATER SECTION

Electric heating section are the section used to provide the desired temperature values of the air. Electric heaters are specially designed for each project according to the required capacity value. The following safety warnings must be applied as standard to electric heater section. Otherwise, there is a high possibility of fire.

Air Flow Control: : With this control, the operation of the electric heater is inhibited if the air flow is not detected during operation of the air handling unit. Otherwise, the electric heater working without air current will overheat and cause fire, malfunction.

High Temperature Control: If the electric heater section is over-heated due to any reason, it will allow the electric heater to be deactivated.

Door On-Off Control: If there is a door in any section after the electric heater, the electric heater is deactivated when it is informed that this door is open. Because the air will be drawn from the opening door and the air stream will not pass through the electric heater.

Timing Control: : When the air handling unit is switched off, the electric heater is first deactivated and the fan is deactivated after a specified time. In this way, the heat energy on the electric heater is also transferred.

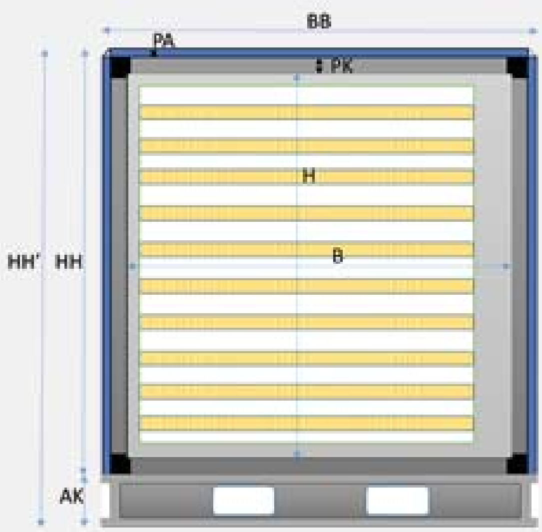
ELECTRICAL HEATER SECTION SIZE CALCULATION

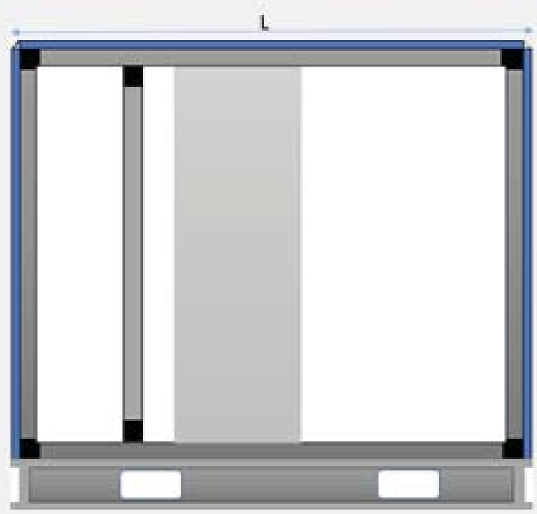
Definitions:

Model Number:	JUPITER H x B (Number of Height Modules x Number of Width Modules)
Module Constant (m):	76,5 mm
Panel height (P):	25 mm
Profile Height (T):	25 mm
Section Height (H):	Number of Height Modules x Module Constant
Section Width (B):	Number of Width Modules x Module Constant
Section Height (HH):	Section Height+ 2xProfil Dimension + Panel Height+ Foot Height
Section Width (BB):	Kesit Genişliği + 2xProfil Ölçüsü + 2xPanel Yük.
Section Length (L):	Number of Length Modules x Module Constant + 2xProfile Dimension + 2xPanel Height

Example Calculation;

JUPITER 8 x 12 (Number of Length Modules 16)
HH: 8x76,5 + 2x25 + 25 + 150 = 837 mm
BB: 12x76,5 + 2x25 + 2x25 = 1018 mm
L: 16x76,5 + 2x25 + 2x25 = 1316 mm





If it is intermediate section, L-size calculation is L: 16x76,5 + 2x25
If it is first or last section, L-size calculation is L: 16x76,5 + 2x25 + 25

2.4.8. SILENCER SECTION

There is noise generated in air handling units due to design criteria. In air handling units, this sound source is usually a fan section. A silencer section generally made of glass wool material is placed at the entrance or exit of the source to prevent reaching this noise to living quarters. Silencer housings are optimally sized within the section to produce minimal pressure loss and maximum sound absorption performance. These distances, which we call the housing space, are calculated separately for each silencer. The rounded parts of the sheet used in the air inlet of each compartment minimize the air side pressure loss.

SILENCER SECTION SIZE CALCULATION

Definitions:

Model Number:	JUPITER H x B (Number of Height Modules x Number of Width Modules)
Module Constant (m):	76,5 mm
Panel height (P):	25 mm
Profile Height (T):	25 mm
Section Height (H):	Number of Height Modules x Module Constant
Section Width (B):	Number of Width Modules x Module Constant
Section Height (HH):	Section Height+ 2xProfil Dimension + Panel Height+ Foot Height
Section Width (BB):	Kesit Genişliği + 2xProfil Ölçüsü + 2xPanel Yük.
Section Length (L):	Number of Length Modules x Module Constant + 2xProfile Dimension + 2xPanel Height

Example Calculation;

JUPITER 8 x 12 (Number of Length Modules 16)
HH: 8x76,5 + 2x25 + 25 + 150 = 837 mm
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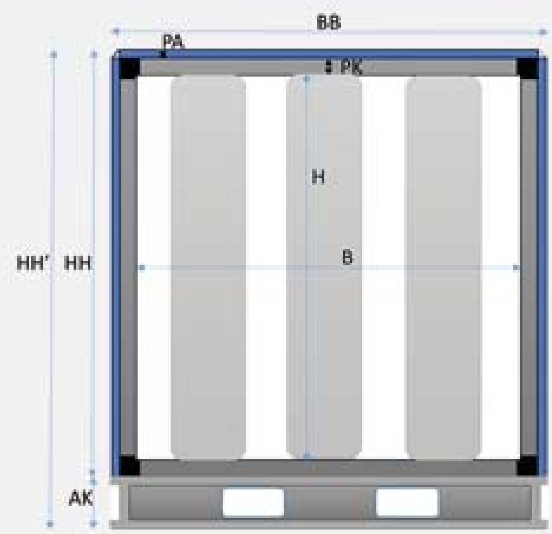
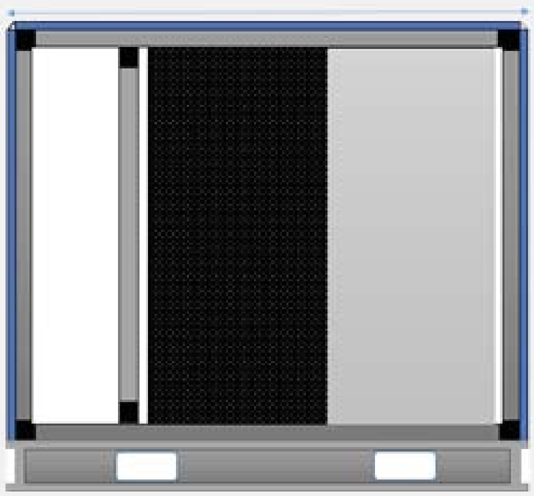


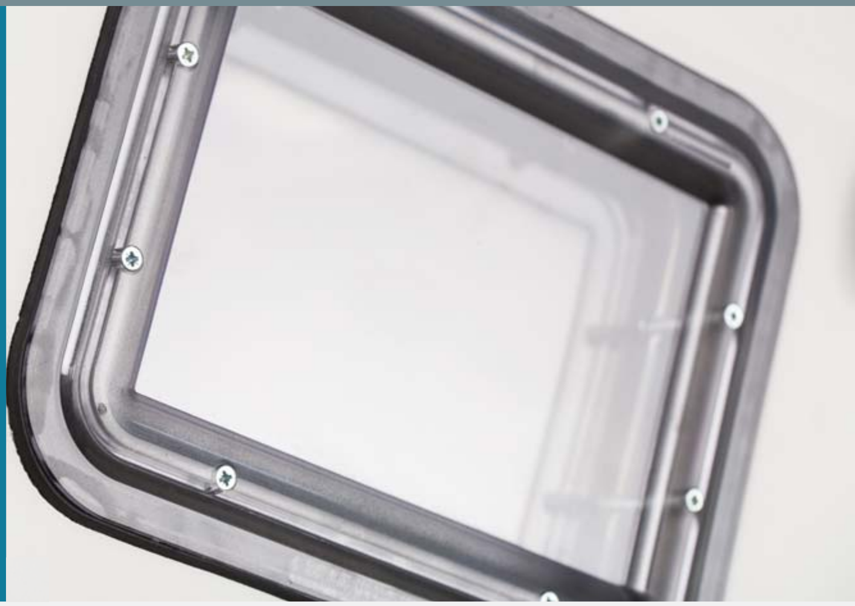


If it is intermediate section, L-size calculation is L: 16x76,5 + 2x25
If it is first or last section, L-size calculation is L: 16x76,5 + 2x25 + 25

2.5 2.5. ACCESSORIES

2.5.1. OBSERVATION WINDOW

It is used to monitor the inside of the section from the outside without entering the unit. Round and rectangular options are available. Generally; it is preferred in filter section, fan section, humidifying section.



2.5.2. LIGHTING

It is used to illuminate the inside of the section during operation or service. It is used together with connection cables, on-off switches and connectors. There are two types, comfort application and hygiene application.

2.5.3. SERVICE DOOR CONTROL EQUIPMENT

Opening of the doors of the air handling unit without under control during operation is very important both in terms of safety and performance of the appliance. For this reason, the service gate control element is used to obtain status information that the door is open or closed.

2.5.4. LIQUID COIL VALVE AND VALVE MOTOR

It is used to set the fluid flow through the exchangers that performs the heating and cooling processes in the air handling unit. It is very important for the capacity control of the device. Two-way and three-way options are available.

2.5.5. REPAIR MAINTENANCE SWITCH

It is used to disconnect the entire power supply of the device from a single point in terms of work safety during service of the air handling unit. Different models are used according to the total power capacity of the device.

2.5.6. EMS BUTTON

It is used to stop immediately of the air handling unit for emergency during operation or when it is necessary to cut and stop the entire power supply directly at the time of service. It is recommended to use in fan section, damper section, and electric heater section.

2.5.7. PRESSURE DIFFERENTIAL SWITCH

It is the equipment that senses the set pressure value is reached. These equipments are frequently used to obtain filter section, fan flow and belt breakage information.

2.5.8. DAMPER MOTOR

They are used to control the flow rate in the air handling unit by manually or proportionally adjusting the interval positions of the dampers used.

2.5.9. FREEZING THERMOSTAT

This is used to detect the risk of freezing of water in the water heat exchangers used for heating and cooling and to generate a warning signal.

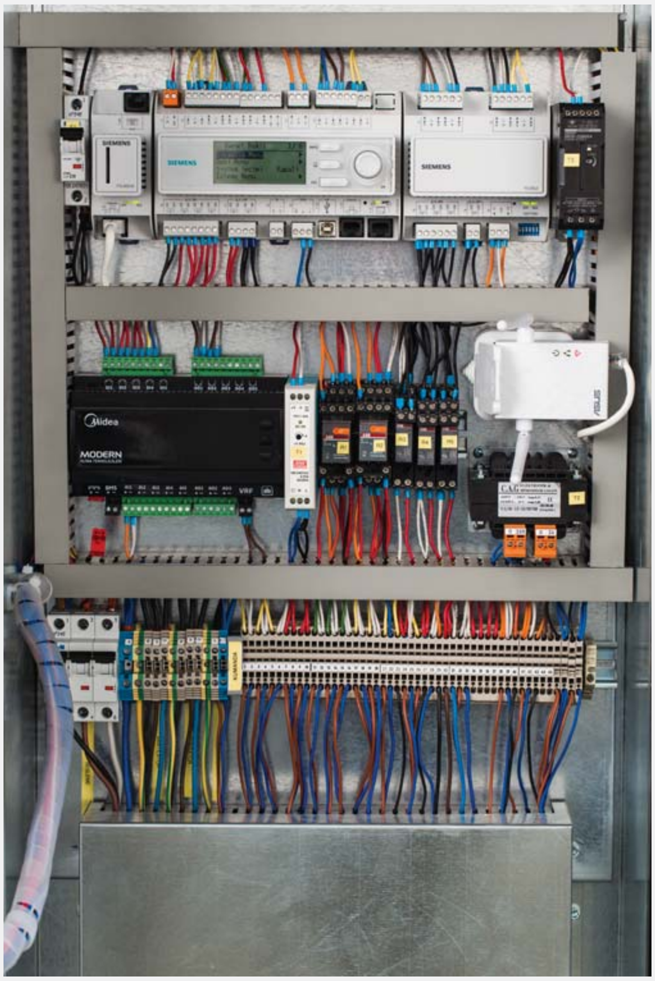
2.5.10. MOISTURE AND TEMPERATURE SENSOR

It is used to observe the humidity and temperature values of the air at the air inlet or outlet points of the air handling unit. It is especially recommended to use it for precise comfort conditions.

2.5.11. FREQUENCY INVERTOR

It is used to adjust the speed of the motor used and thus to keep the fan speed under control. Especially it is recommended to use it in applications where fixed flow rate is required and the amount of flow required in the environment changes frequently.

2.6. AUTOMATION



The climate needs of the living quarters may show constant changes according to the time, season, usage factors, and physical characteristics of the building. Control systems must be used to respond to these desired variable requirements in time and at the desired specifications.

These controls in the air handling unit can be summarized as follows.

- Humidity and temperature control
- Air quality control
- Airflow control
- Pressure control
- Filter dirty and change time control
- Capacity control, according to the change in day
- Safety checks during service
- Damper controls
- Anti-freeze control
- Electric heater safety check
- Free cooling control at mid season
- Fire control
- Day and time planning control
- Control of air handling unit mechanical components

In the automation system, automation equipments and projecting are needed for the above mentioned controls. These equipments are as follows;

- Differential pressure switch
- Humidity and temperature sensor
- Damper motor
- Freezing thermostat
- Frequency inverter
- Flow Control sensor
- Indoor air quality sensor

NOTES

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